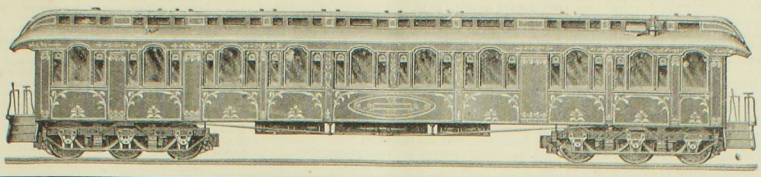
NATIONAL CAR AND LOCOMOTIVE BUILDER.



VOLUME XVII. NUMBER 7. | JULY, 1886. | SINGLE NUMBERS, TEN CENTS. $1.00 PER ANNUM.

Miscellaneous Items.

MR. J. BRANDT, general superintendent of the Oregon & California Railroad, is a son of Mr. John Brandt, one of the pioneer locomotive builders and master mechanics of America.

THE extensions to be made by the Chicago, Rock Island & Pacific Railway this summer, will require the addition of 50 locomotives and 3,000 cars to the rolling stock of the road.

MR. AUGUSTINE W. WRIGHT, one of the ablest civil engineers of the West, has resigned the position of chief engineer for the North Chicago Railway, and gone into business for himself as consulting engineer and contractor.

THE Central Iowa shops at Marshalltown, Ia., of which Mr. John Player is master mechanic, have received some new tools lately. They have got a steam hammer, a wheel-boring machine and other smaller tools, all badly needed.

MR. F. W. GILBERT, superintendent of the Northern Pacific Railroad, at Missoula, Mont., did drafting work occasionally for the NATIONAL CAR-BUILDER when he was a youth attending the engineering classes. Mr. Gilbert made his mark on the Northern Pacific by his success in designing buildings.

MR. J. E PHELAN, an honored correspondent of the NATIONAL CAR AND LOCOMOTIVE BUILDER, has been promoted to the position of traveling engineer of the Northern Pacific Railroad. Special work has been laid out for Mr. Phelan in watching the effect of arrangements designed to promote fuel economy.

MR. F. G. BROWNELL, master mechanic of the Burlington & Lamoille Railroad, recently obtained patents on two inventions that promise to be valuable improvements on railroad machinery. One is for an axle lubricator, the other is for a peculiar form of metallic packing for piston rods and valve stems.

MR. S. W. WITTENBERG, M. E., in charge of a mechanical department of a railroad in Austria, has written asking permission to translate and publish Locomotive Engine Running and Management, by Augus Sinclair, into German. He writes enthusiastically about the merits of the book.

AN order has been issued by President Huntington of the Newport News & Mississippi Valley Railway, requiring all designs relating to the rolling stock and maintenance of way departments to be submitted to him for approval. The object of this order is to insure the maintenance of standards that are to be adopted throughout the whole system of Huntington roads.

THE Westinghouse Air Brake Co. announces that, inasmuch as its air brakes have now been in use some 15 years, there are a large number of pumps which need general repairs, and, therefore, in order to promote the highest efficiency, the company will supply new pumps of latest design and allow half price for return of old and partially worn-out pumps.

THE latest improvement put upon English locomotives is the poppet balance throttle valve universally used on American engines. In about ten years, more or less, when our British cousins begin to perceive the advantage of using this form of throttle valve, they will discover that it is an English invention first used on the Stockton & Darlington locomotives sixty years ago.

DURING the California gold excitement in 1851, an urgent demand arose for a railroad across the Isthmus of Panama, and a line was surveyed which called for heavy gradients. Contracts were made to use the Sellers rack-rail locomotives for operating the road, but before grading began a better route was found that dispensed with the use of rack-rails. The company interested in building the Sellers locomotives then prosecuted the Panama Railroad Company for breach of contract and obtained a verdict for $14,000 damages.

MR. L. B. PAXSON, engineer of machinery of the Philadelphia & Reading Railroad, has recently turned out five new locomotives and twenty-five first-class passenger cars from the Reading shops. The engines are eight-wheelers 18×24 inches, with Wootten boiler. The cars are 58 feet long, substantially built and handsomely finished.

THE Northern Pacific Railroad Company employ no Chinamen in any capacity whatever. This is the only railroad company on the Pacific Coast that does not use Chinamen as section hands. Adhering to the principle of employing no Celestials costs something in dollars and cents, for while Chinese section men are paid only ninety cents or one dollar a day, white men to do the same work have to be paid $1.75 a day.

A MEMBER writing to the *Locomotive Engineers' Journal* about economy of fuel in firing locomitives, insists that a traveling fireman is needed on nearly all roads, who could show the fireman how to do their work properly. This writer, who appears to know what he is talking about, holds that the average traveling engineer is no use as a promoter of economical firing, because he does not generally know how to instruct a fireman who fails to do his work properly.

ONE of the most intelligent railroad men we are acquainted with, a man who has risen over the foot-board to a responsible position through the force of merit, writes of his new duties : "I do not make hard work of it, but it is hard work, using one's mind and faculties all the time. It is very different from running an engine where work is done at a certain time, for my work is never finished. I believe running a passenger engine pays better for the hours of service and ability required than any other business in the universe, outside of a government sinecure.

THE committees of the Car-Builders' Association are deserving of commendation for having their reports ready when called for at the recent convention. We notice but one important exception, which was the committee on the Maximum Outside Dimensions of Freight Cars. The subject is a new one and a committee to report upon it was appointed last year for the first time. No report was forthcoming this year, however, not even a verbal one, and a new committee is to be appointed to report next year.

THE change of gauge of the Louisville & Nashville system of roads was commenced on Friday, May 30th, and completed Sunday, May 31st. The system includes 1,593 miles of main line, 213 miles of side track, 312 miles of branch lines and 16 miles of branch sidings. This is the greatest feat of the kind ever attempted, and required the service of 8,736 men. In making its changes the company's officers were ably assisted by its employés in all departments. They not only worked with more than ordinary energy, but a large number of its engineers, firemen, conductors and brakemen voluntarily tendered their services free to the company on the day of change.

AT the Master Car-Builders' Convention, Mr. McWood, superintendent of the car department of the Grand Trunk Railway, related a curious experience with a steel-tired car wheel. The tire broke, and he was about to remove the wheels, when Sir Henry Tyler, president of the road, happened to walk into the shop. He advised Mr. McWood to keep the wheel in service, saying that he would take the responsibility for every risk. Sir Henry was familiar with very searching tests that had been made on the wheels in England, and felt assured that the Mansell retaining rings would prevent accident. The wheel was accordingly sent out with the broken tire, and run eighteen months in that condition, and was only removed because the cracked point was wearing flat.

WHEN Mr. George S. Strong designed the valve motion that was illustrated in the NATIONAL CAR-BUILDER last year, he arranged to use bronze valves, thinking that cast iron would not be strong enough. When the engine having these valves on went into service it was found that they wore too rapidly. He then changed them for valves made of Eureka steel, and we understand that material gives admirable results. Our experience with steel cross-heads and steel axle-boxes led us to the conclusion that steel valves would never work, but results say we were mistaken. Eureka steel is, however, a different material from the ordinary run of steel castings. It is a sort of steely cast iron retaining the wearing attributes of cast iron with the tensile strength of cast steel.

THE advantage of heated air as an aid to perfect combustion was well illustrated by experiments recently carried out in Pittsburgh with boilers where natural gas was used as fuel. Tubes of refractory clay are placed under the boilers open at the back wall to the air, the grates are removed and a bridge erected about 16 inches from the front wall or firing door. Between this bridge and the front wall, an open flue about 10 inches wide is left extending the width of the furnace. Into this flue the air is drawn by the tubes, and at the upper end it meets the gas, both mingling and combustion occurring as they flow over the bridge wall. In its passage through the tubes, the air is heated to 1,500° Fah. Boilers requiring 1 pound of gas pressure to keep up steam were equally efficient with 2¼ ounces of pressure when the air was heated.

DURING the famous excursion arranged by Mr. Villard over the Northern Pacific there were several English noblemen present who acted very snobbishly throughout, and made continual complaints because the trainmen and railroad officials showed no disposition to toady in the presence of nobility. One gentleman, who we will call Lord Tomnoddy, was so offensive to all he came in contact with that they eventually put him and his belongings off the train. The Northern Pacific people tell a joke on Mr. J. M. Buckley, assistant general manager, in relation to the nobleman referred to. Mr. Buckley had the duty of assigning the different members of the party to their respective berths. In doing this, he said to Lord Tomnoddy, "You and your wife will occupy section No. —." At this my lord flared up on his dignity, and replied, "I wish you fellows to understand that this is Lady Tomnoddy." "Well," answered Mr. Buckley, "she's your wife, ain't she?"

THE Cumberland & Pennsylvania Railroad is a small road, so far as mileage is concerned, but it does a large business, and no road of equal mileage has such heavy machinery. Among 31 locomotives, the lightest weighs 91,000 pounds, and a large proportion of them weigh 117,600 pounds. The latter are consolidation engines, designed by Mr. N. W. Howson, Master of Machinery of the road, and built under his supervision in the Mount Savage Locomotive Works. These engines have cylinders 20 × 24 inches, straight boilers 58¼ inches diameter and provided with 205 flues 2¼ inches diameter. They daily pull 215 gross tons up a grade 184 feet to the mile. Mr. Howson learned the machinist trade in the Royal Arsenal at Woolwich, England, and during the war was closely associated with armory work in Southern workshops. He made six Armstrong guns at Norfolk Navy Yard before it was taken by the Union troops, and he put the engines into the Merrimac and was on board that vessel during the fight with Ericsson's Monitor.

AT the beginning of last month between nine and ten thousand miles of Southern railroad track was changed from 5 feet to 4 feet 9 inches gauge, and the work was done with scarcely any delay to traffic. The change was in nearly all instance completed in one day. For months back the mechanical departments of the various Southern roads interested have been preparing the rolling stock for the change, and a sufficient number of engines and cars were ready to carry on the business on the narrowed gauge. The older portions of the rolling stock that can be changed only with great difficulty are left to be worked over at leisure. This will keep many Southern shops unusually busy for months to come. The change will result in sending to the scrap heap a great deal of rolling stock that would have kept car and locomotive repairers busy for years. Many mechanical antiquities will disappear, but the service of the roads will be improved by the forced abandonment of worn-out machinery.

Master Car-Builders' Association.

TWENTIETH ANNUAL CONVENTION.

The twentieth annual convention of the Master Car-Builders' Association was called to order by the president, Mr. R. K. Verbryck, of the Chicago, Rock Island & Pacific road, at the International Hotel, Niagara Falls, at 10 A. M., June 8.

The roll call showed a large attendance of both active and representative members, the particulars being given elsewhere.

PRESIDENT'S ADDRESS.

"Nearly a fifth of a century has elapsed since about forty master car-builders held a meeting at Springfield, Mass., and organized the Master Car-Builders' or, as it was then called, the National Car-Masters' Association. Previous to that date informal meetings had been held at West Albany, New York, and Adrian, Mich., of which there are no records in existence. But the first general convention was held at Springfield, Wednesday, May 15, 1867. At this meeting a committee was appointed to take into consideration the propriety of forming themselves into a Master Car-Builders' Association, and were directed to report a constitution and by-laws at an adjourned meeting to be held at Altoona, Pa., Sept. 18, 1867. At the time appointed the meeting was held and the constitution and by-laws adopted. It is not my intention to go into a history of the association from that date to this the twentieth annual convention, but to call to remembrance the important results accomplished from the organization of the association, though the results accomplished have fallen far short of what we could have wished in the matter of uniformity, still a great deal has been done towards the objects for which the association was organized. If nothing else had been accomplished except the interchange of ideas between the members of the association, I think it will be conceded that even that would have richly repaid us for the trouble of meeting together once a year and getting acquainted and forming friendships that will last as long as we live. But that is not all that has been accomplished. We have from small beginnings and very little influence gradually arrived at a stage when there are very few of our general managers who do not recognize the importance of our organization, as can be seen by the large number of cars represented by our representative members at last year's convention—nearly half a million—representing a vast amount of capital. I hope at this meeting greater progress will be made toward getting standard forms and appliances for freight cars. We all realize the great importance of this subject, and as the interchange of freight cars becomes greater every year, it becomes more and more difficult the longer we put it off. I myself feel that if a standard truck and castings could be adopted, though I did not consider them as good as some others, I would be glad to adopt them to save making so many patterns, and in some cases sending long distances for castings to repair cars broken on our road and cars waiting in repair yards, often weeks, before the material ordered to repair them is received. The question of automatic brakes for freight cars has become one of great importance, and we had hoped to arrive at some conclusion before our meeting this year, but circumstances have made it impossible at this time. I am glad to state, however, that the committee having this subject in charge have made arrangements for a test that will, we hope, arrive at some definite conclusion before our next annual convention. As this is a very important matter, perhaps it is best that we do not proceed too hastily, and that the delay will be for the best, so that no mistake is made.

In accordance with a resolution passed at our last annual convention referring the subject of automatic freight-car couplers to the executive committee, with power to arrange for and conduct a public trial at some central point, the committee invited inventors of couplers to a trial at Buffalo, N. Y., September 15, 1885. Accordingly at that date a trial was made of between forty and fifty different kinds, and twelve of the number were selected and recommended for further trial, a report of which will be submitted to the association by the executive committee.

The separate organization having in charge the rules of interchange that met in one session of our convention every year for their revision was merged into the Master Car-Builders' Association at our last annual meeting and a committee appointed to revise and codify the rules and submit them to the executive committee before the next annual meeting of the association. The work of the committee has been revised by the executive committee and at the proper time will be submitted to you for your approval or rejection. Whether the rules as amended and codified are approved or not, I think the committee deserve great credit for the amount of time and labor they have expended on them, and I hope they will be given the full consideration they merit.

Since our last annual convention two of our members have been removed by death—A. G. McCuen, of the Atlantic & Pacific, at his home, Albuquerque, New Mexico, Nov. 19, and H. F. Snyder, of the Pardee Car Works, at Watsontown, Pa., Nov. 25, 1885. A committee should be appointed to prepare memoirs of their lives to be published with the annual report of the association. In conclusion, allow me to express the hope that our sessions will be conducted with as much harmony and good feeling as the previous ones have and that we may be permitted by a kind providence to meet many more times at our annual conventions.

SECRETARY'S REPORT.

Secretary M. N. Forney read his annual report, in which he stated that the membership of the association, as published in last year's annual report, was 145 active members, 76 representative members and two associates, making a total of 223 members. Since then the names of ten active members were taken from the list for non-payment of dues, five resigned, two died and two were appointed representative members, two representative members became active members and twelve active members have joined the association since last meeting, making a net loss of five active members. One representative member was suspended, four have been suspended for non-payment of dues, one became an active member and seven new representatives have been appointed since the last meeting, making a gain of three representatives.

The money collected during the year was $3,238.41. The expenditures were $4,146.71. The report adverted to the unsatisfactory condition of the finances, and closed with the words: "One way of reducing expenses would be to get a low-priced secretary, an expedient which the executive committee would do well to entertain. Before they act on it, however, the present incumbent would like to remind those upon whose shoulders the financial responsibility of the association will rest next year, that perpetual resistance to the importunities of inventors of car couplers is something, and certainly, if the association expects its secretary to act as a buffer between its members and the cranks of all christendom, it should make some provision for his old age, which is certain to be premature."

SPECIAL COMMITTEES.

The president announced the following committees:

To nominate officers: R. H. Soule, Robert Miller, C. A. Smith, William Forsyth and John Hodge.

To select next place of meeting: R. C. Blackall, Clement Hackney and W. B. Snow.

Correspondence and Resolutions: G. W. Rhodes and H. A. Webster.

Subjects: J. W. Marden, John W. Cloud and T. A. Bissell.

Auditing: L. Garey, H. D. Titus and Geo. W. Demarest.

AMENDMENTS TO CONSTITUTION.

Mr. E. B. Wall moved that the Constitution be altered empowering the executive committee to increase the assessment from $5 to $8 if necessary. Carried.

Mr. Wall then moved that Article VIII., Sections 3 and 4 of the Constitution be altered to require the President to consult with the executive committee in the appointment of committees for investigation. Mr. Wall disclaimed any intention to curtail the authority of the president by the change proposed, as had been charged by leading railroad papers. His desire was to aid the president so that the members of committees selected might be well acquainted with the subjects they were required to investigate, and that men might be chosen who could meet frequently and act together.

Mr. L. Garey favored the change and thought it would relieve the president of onerous duties, and he moved farther that the executive committee choose committees in consultation with the president. After some discussion this motion was carried.

Mr. J. W. Cloud made the point that Mr. Garey's amendment was not constitutional, as a year's notice of a change was required, and called for a reconsideration of the motion. He moved that the Constitution be amended as proposed last year.

The subject was taken up for reconsideration, and after some discussion it was agreed to let the matter lie over till Thursday.

VOTE OF THANKS.

A vote of thanks was proposed and carried to Mr. F. W. Wilder and the officers of the New York, Lake Erie & Western Railroad, for furnishing the use of their track and other facilities for conducting the car coupler tests at Buffalo last September.

A motion was carried altering Article VI. of the By-laws so that the Rules of Interchange of Cars shall be the special order of business at 10 A. M. on the second day of meeting.

REPORT OF COMMITTEE ON A STANDARD FREIGHT-CAR TRUCK.

To the Master Car-Builders' Association:

In presenting the Fifth Annual R port on a Standard Freight-Car Truck, we again refer to the previous reports and the discussions on them, which are contained in the printed proceedings of the Association as follows:

Niagara Meeting,	1882,	page	54.
Chicago "	1883,	"	79.
Saratoga "	1884,	"	36, 102, 108.

Old Point Comfort Meeting, 1885, page 46 to 55.

At the last meeting general plans were submitted for a diamond truck with channel transoms, arranged to be used with a swing bolster or with a rigid one. The report recommended that a number of trucks be built by the different roads from the plans presented, and that they be put into service for trial. This recommendation was approved by the Association, but the only roads known to us which have built the proposed standard trucks are the Michigan Central Railroad and the Chicago, Burlington & Quincy Railroads. These roads have each sent to Niagara Falls a pair of trucks, and they are now on exhibition at the New York Central depot.

Both of the Michigan Central trucks has a swing bolster, and one a rigid *iron* bolster. Those sent by the Chicago, Burlington & Quincy Railroad have trussed wooden swing bolsters. Twelve of these trucks have been in service about six months, under passenger tenders on the different divisions of the road, and have given good satisfaction. A pair of trucks with rigid bolsters have also been built recently by this company, and are now in a similar service.

The details shown on the drawing, sheet 1, are similar to those on the Chicago, Burlington & Quincy sample trucks. The iron bolster used by the Michigan Central road in their sample truck is shown on sheet 2.

The Master Car-Builders' Journal Box, as modified for larger bolts, is shown on sheet 3.

The brake gear is shown on sheet 4.

These general plans and details, excepting the center plate, are now recommended as standard.

The object of the Association (as stated in the Constitution) being "to bring about uniformity and *interchangeability* in the *parts* of railroad cars," it is rather surprising that no effort has been made heretofore to secure interchangeability between the two grand divisions or largest *parts* into which a car is divisible, namely, the car body and the truck. It is quite probable that the sample trucks would not fit under any car not built specially for them. Chicago, Burlington & Quincy car, sent with the trucks, had the body side bearings spread 4 in. in order to make them fit those on the truck.

The center-plates on the Michigan Central trucks are the standard pattern for that road. Those on the Chicago, Burlington & Quincy trucks are the Chicago, Burlington & Quincy standard pattern, and they are not interchangeable with those of any other road.

A standard spread and height of side bearings and forms for center plate bearings have thus incidentally become a part of this report.

In order to ascertain the practice of the different roads in these details we sent out circulars asking the members to recommend a standard spread of side bearings and forms for center-plates. Replies from 28 members give distances varying by fractions of an inch from 50 inches to 63 inches; the majority of them, of course, preferring that of their own road, and those recommending anything different naming 60 inches as a desirable distance between centers of side bearings.

In a swing bolster truck the position of the side bearings affects the position of the spring hangers, and with bearings outside the hangers it is best to spread them as far out as possible, so as to bring the springs near the side frame. The following is a list of twenty-eight roads reporting spread of side bearings in reply to our circular.

DISTANCE CENTER TO CENTER OF SIDE-BEARINGS REPORTED BY TWENTY-EIGHT ROADS.

Illinois Central	42⅛ inches
New York, Lake Erie & Western	50 "
Pennsylvania	50 "
Pittsburgh, Fort Wayne & Chicago	50 "
Chicago & Atlantic	54 "
Boston, New York & Philadelphia	55½ "
Atchison, Topeka & Santa Fe	56 "
Chicago, Burlington & Quincy	56⅝ "
New York Central & Hudson River	58 "
Buffalo, Rochester & Pittsburgh	58 "
Wabash	58 "
Missouri Pacific	58 "
New York, Chicago & St. Louis	58 "
Baltimore & Ohio	58 "
Flint & Pere Marquette	58½ "
Chicago, Rock Island & Pacific	58½ "
Chicago & Eastern Illinois	60 "
Great Western Dispatch: Erie & Pacific Dispatch	60 "
Norfolk & Western	60 "
Northern Pacific	60 "
Hot Springs	60 "
Lehigh Valley	60 "
Indianapolis Car Co	60 "
New York, Susquehanna & Western	60 "
Philadelphia & Reading, New Jersey Division	61 "
Chicago & Alton	62 "
Lake Shore & Michigan Southern	62 "
Boston & Albany	64 "

The drawing, sheet 1, show the side bearings, five feet between centers. This distance seems to be the nearest to that preferred by the majority of the members reporting, and it is recommended as a standard for both truck and car body.

The vertical relation of the center-plate bearing must also be fixed, in order to secure a fit between the truck and car body. The height of side bearings from bolster are shown on sheet 6.

The darwings of center-plates, sent by request of our circular, show as great a diversity of formsand sizes as is usually found when any new investigation is made on the subject of existing practice in freight-car details.

Center plates may, however, be divided into three general forms, and they are shown so grouped on sheet 5.

First—Center plates in which the bearing is a portion of a sphere with an annular boss around the center-pin. The Erie, Michigan Central and Lehigh Valley plates are types of this form.

Second—The large center bearing where the bearing surface is a flat-edged ring of large diameter, sufficient to support the car body horizontally without the aid of side bearings. The Philadelphia & Reading and the Pennsylvania Railroad are types of this form.

Third—Center plates in which the bearing surface is a small ring, either rectangular or semi-circular in cross section. The Boston & Albany and the Chicago, Burlington & Quincy are types of this form.

The form of center plate preferred by the majority of members reporting, and that which we think is the best, is the first general form, with a bearing of the shape of a portion of a sphere, in other words, a ball joint. Fig. 1, on sheet 5, gives the dimensions of a center plate of this form which is recommended for standard. Sheet 6 shows this center plate and its vertical relation to the side bearings, which is also recommended as standard.

The following drawings accompany this report:

Sheet 1—General plan and details of proposed standard truck.

Sheet 2—Iron truck bolster, made by Michigan Central Railroad.

Sheet 3—Master Car-Builders' journal box, modified for larger bolts.

Sheet 4—Brake gear for standard truck.

Sheet 5—Twenty center plates, representing present practice.

Sheet 6—Proposed standard center plate and side bearings.

In conclusion, we recommend as standard the general plan and details for a standard freight truck, as shown on sheets 1, 3, 4 and 6.

R. MILLER,
W. FORSYTH,
H. S. BRYAN,
J. N. BARR,
JOS. WOOD,
WM. MCWOOD,
} Committee.

Report was accepted as read.

Mr. John Mackenzie thought more play ought to have been allowed in the center proposed. He said the annular boss on the male plate of the center casting fitted the recess in the female casting on the track too tightly.

Mr. Wm. Forsyth explained that ¼ inch play was allowed at the center, which was all the lateral movement the side-bearing would admit of.

Mr Garey expressed the belief that the proposed center plate would fill up with dirt.

Mr. Robert Miller said the C., B. & Q. road had used this form of center plate for years, and experienced no trouble with the center filling up.

Mr. W. B. Snow said the Illinois Central had always used this kind of center plate and found nothing wrong with it. He objected to certain minor parts of the design. The arch-bars were regarded as too narrow and the hangers far away from the arch-bars.

The discussion was postponed till the members might have the opportunity of examining the truck.

SAFETY APPLIANCES FOR TRAINMEN.

Mr. Forney explained, when the report of the committee appointed to investigate this subject was called for, that no report had been prepared and requested that the committee be continued. This was agreed to.

BRITISH AND CONTINENTAL RAILROAD PRACTICE.

A committee was appointed last year to investigate and report on any matters of interest to American master car-builders there might be in Britain and Continental railroad practice.

Mr. R. H. Scule, who was chairman of this committee, explained that no report had been prepared, and requested that the committee be continued. This was agreed to.

AUTOMATIC FREIGHT-CAR BRAKES.

Mr. G. W. Rhodes, chairman of the committee appointed to investigate this subject, made a verbal report of progress. The difficulties in the way of making a series of tests with different brakes had proved more formidable than they anticipated. The committee held a meeting last October, and agreed that it was impossible to carry out tests before this convention met. But they had arranged to make very thorough tests at Burlington, Ia., beginning July 13 next. Six competitors had entered. The tests will consist of three series of trials. The first will record how each brake, while new and in good order, acts in stopping a train under similar conditions. The second will be an endurance test to show how each brake stands the ordeal of regular service. The third will show how the brakes do their work after the parts have been somewhat worn. To make the endurance test as fair as possible, and to make the work done by all the brakes while in service as nearly uniform as possible, he requested the aid and co-operation of the members. When any brake piece got broken from any cause, the committee wished the pieces to be retained and preserved for inspection. It is the intention to make the third test similar to the first, but with the difference that the brakes will be used after they have been doing work for nine months. Plans of the ground and detailed programme of the tests will be furnished to those interested. Preliminary tests have been made so as to drill crews and get the men well acquainted with the methods of doing the work.

Mr. Rhodes explained that many expenses have been incurred in connection with these tests, and thought that some provision should be made for this by the association. The committee was continued.

REPORT ON TRAP-DOORS IN ROOFS OF PASSENGER CARS.

To the Master Car-Builders' Association:

Your committee appointed to examine and report and furnish plans for Trap Doors in Passenger Car Roofs, have given the matter considerable attention, and have concluded, that in view of the difficulties attending the adoption of such plans, that it would be unwise to recommend any, as we find that the master car builders are almost unanimously opposed to the adoption of such plans.

We have come to this conclusion from the fact that among the many millions of people who ride on railroads in this country and in Canada, that the cases are very few in which doors in a roof would be of any use whatever.

It is generally believed that if a passenger was not held fast in the wreck, that he would be able to get out of some of the many openings that are usually found in our passenger cars, and if a passenger is crushed and held fast in the wreck, the trap door in the roof, or elsewhere, would be of no use to him. These reasons, and others relating to the construction and injury to the strength and durability of a car, lead your committee to the conclusion that they would not advise the introduction of trap doors in passenger car roofs.

F. D. ADAMS,
JOHN MACKENZIE,
} Committee.

The report was received and the committee discharged.

REPORT OF COMMITTEE ON STANDARD DEAD-BLOCKS.

To the Master Car-Builders' Association :

In making a report on this subject the members of your Committee have thought it would be best first to review the action which the Association has heretofore taken with reference to this important subject.

In 1872, 2 ft. 9 in. was adopted as the standard height for draw-bars of freight cars, measured from the top of rail to the center of draw-bar. It was not then specified whether this height was to be measured when the car was loaded or empty.

In 1884, the Executive Committee, in a report on the revision of standards, recommended that "the standard height of draw-bars for freight cars, measured perpendicularly from the tops of the rails to the center of the draw-bar, is hereby declared to be 2 ft. 9 in. *when the car is loaded to its full capacity.*" This recommendation was discussed at considerable length, and the words "when the car is loaded to its full capacity" were stricken out, and the words "*when the car is empty*" were substituted for them, and the standard height of draw-bar which is now recommended by this Association is 2 ft. 9 in. when the car is *empty*.

In 1882 it was recommended "that when double dead-blocks are made, they be made 8 in square on the face, and 6 in. thick, and placed 20 in. apart, center to center, giving a clear space between them of 12 in., and that those whose preference is for single dead-blocks must make them not less than 28 in. long, 7 in. thick and 8 in. face." It was recommended "that the height of the dead-blocks from the rail to the bottom of the block be 3 feet."

In 1883 a committee recommended "that when double-blocks are used they measure not more than 30 in. from out to out, each block to be 20 in. (?) long and 8 in. wide, and when the single block is used, must not be less than 28 in. long by 7 in. thick and 8 in. face."

In the discussion which followed, the report was amended and re-amended, until its recommendations were substantially the same as the standard adopted the year before. Mr. Goodwin then moved "that the dimensions for single and double dead-blocks recommended by the Committee in their report, as amended, be referred to the members of the Association for decision by letter ballot, according to the Constitution." In explanation of the motion, Mr. Goodwin said : "The difference between the report of the Committee and the standard of last year is this : The double dead-block last year was 6 in.; the recommendation of this Committee is that it should be 8 in., which is a very wise one for the safety of the trainmen."

Mr. FORNEY suggested that Mr. Goodwin should put his resolution in such a way that the question shall be submitted to the Association whether the dead-blocks shall be 8 in. thick instead of 6 or 7.

Mr. GOODWIN declined to do that ; his resolution was then adopted.

At the same meeting a resolution was adopted "instructing the Executive Committee to revise the resolutions relating to the recommendation of standards, and report to the next annual meeting what action, if any, is required to correct existing errors and discrepancies in the previous action of the Association.

After the adjournment of the Convention an examination of the discussion and action of the Association showed that the Committee's report was amended in such a way that its recommendations were in substantial agreement with the standard for dead-blocks adopted the year before, and that in reality the only question to be submitted was whether the thickness of the blocks should be changed from 6 or 7 in. to 8, and that the Committee did not recommend. No letter ballot was therefore taken on the resolution of Mr. Goodwin.

In 1884 the Executive Committee recommended "that the distance, 12 in., between dead-blocks, recommended at the Sixteenth Annual Convention, be changed to 14 in.; that the length over all be changed from 28 to 30 in., and the distance from center to center made 22 in., instead of 20."

This recommendation was submitted to letter ballot the same year and was adopted. In the engraving printed in the circular sent out with the letter ballot, the double dead-blocks were shown 8 in. thick, in accordance with the action of the Association of the year before. No distinct ballot was taken with reference to a change of the thickness of the blocks, but it was said in the circular that the proposed changes were shown in the engravings. It is therefore a little doubtful whether 6 in. or 8 in. is the present standard of thickness for double dead-blocks. Fortunately the matter is one of not very great importance. With the exception of the thickness of the blocks, about which there is some doubt, the engraving on page 137 of the last Annual Report represents correctly the present standard dimensions of dead blocks.

Your Committee are quite well aware of the disfavor with which any change of standard already adopted by the Association is regarded, and properly so, by a majority of its members. Nevertheless, if there is good reason for making such a change, the sooner it is done the better. In the case of the standard dead-blocks, it will be seen that the height from the tops of the rails to the under side of the sill is 3 ft. This would make the height to the center of the dead-block 40 in. The height of draw-bars and dead-blocks of 24 of the principal railroads is given in the following list :

NUMBER OF CARS OWNED BY, AND STANDARD HEIGHT OF DRAW-BARS AND DEAD-BLOCKS ON DIFFERENT ROADS.

	Number of cars owned.	Height from top of rails to center of draw-bar. in	Height from top of rails to center of dead-block. in.
N. Y. C. & H. R.	31,117	33⅝	44
N. Y., W. S. & Buf.	7,721	33	42
Pennsylvania	47,013	35	42¾
N. Y., L. E. & West.	31,000	34	42¾
Lehigh Valley	24,247	35¾	...
Del. & Hud. Can. Co.	11,392	33½	44¾
Buf., N. Y. & Phila.	5,680	34	43¾
Del., Lack. & West.	24,000	32½	
Chic., Bur. & Quincy	17,940	33	40¼
Chic., Rock Is. & Pac.	8,081	33	40
Chicago & North	21,000	33	41⅛
Illinois Central	9,075	33	41½
Grand Trunk	10,375	33	41
Intercolonial	4,745	33	40½
Missouri Pacific	18,050	33½	42
Central Vermont	3,256	33	40¾
Bur., C. R. & Northern	4,307	35	42
Mobile & Ohio	1,553	34½	41½
Lou., N. A. & Chicago	2,286	35	43½
Chi., Mil. & St. Paul	20,498	33½	41¼
Detroit, Lan. & North	2,681	33	39¾
Chesapeake & Ohio	5,953	35	43½
Baltimore & Ohio	21,912	35	44½
Chicago & Alton	6,666	35	43½

From this it will be seen that on only three of the roads are the dead-blocks placed as low as the standard height. All the other roads place them higher. This is tolerable good evidence that the standard height is too low.

By comparing the height of draw-bars in actual use on the different roads named, it will be seen that a majority—15 of them—are over 33 in. high. If we count the cars owned by those roads, we find that those lines which place the draw-bars higher than the Master Car-Builders' standard own 239,755 cars, whereas those which have adopted 33 in. or under, own only 100,793. It is fourteen years since the standard height of 33 in. was recommended by the Car-Builders' Association, and yet it has not secured a more general adoption than the figures which has been quoted indicate. All the members of the Car-Builders' Association will agree that it is very desirable to secure uniformity in the height of draw-bars. The question then comes up, with the prevailing practice which has been described, what is the best method to adopt to secure uniformity? Is it to adhere to the standard which was adopted fourteen years ago, or would the end aimed at be best secured by a modification of it to suit the existing practice of the principal lines? Doubtless, if the standard was to be established to-day, it would be made higher than it was in 1872. As already stated, in 1884, when the standards were revised by the Executive Committee, they recommended that the height of draw-bars should be 2 ft. 9 in. "when the car *is loaded to its full carrying capacity.*" The Association overruled the recommendation of the Committee, and made 33 in. the height when the car is *empty*. The discussion of this subject, however, revealed that many of the members misunderstood that the standard height was to be measured when the car is *loaded*. In recommending a standard for dead-blocks the Committee at the outset have encountered the difficulty that the present height of draw-bars is *too low*, and as it determines, to some extent, the height of the dead-blocks, the Committee were compelled to consider the one standard as well as the other. The question which they felt obliged to entertain was that which has already been stated, that is, what action of the Association will be most certain to bring about uniformity in the height and dimensions of draw-bars and dead-blocks? On careful investigation, your Committee were compelled to conclude that some modification in the standard height of draw-bars and dead-blocks is essential to secure their general adoption.

They therefore recommend :

1. That the standard height of draw-bars for freight cars, measured perpendicularly from the tops of the rails to the center of the draw-bar, shall not exceed 2 ft. 11 in. when the car is empty, nor be less than 2 ft. 9 in. when it is loaded.

2. That the height of dead-blocks, measured from the tops of the rails to the center of the blocks, be not less than 3 ft. 5 in. when the car is loaded, nor more than 3 ft. 9 in. when it is empty.

3. That when double dead-blocks are used their vertical height and their width, measured crosswise to the track, be each 8 in., and their thickness, measured lengthwise to the track, be 6 in.; that they each consist of a casting as represented by the drawing submitted with this report.

4. That when a beam attached to the end-sill is used for carrying the dead-blocks, that it be made 36 in. long, not less than 4 in. thick, and 8 in. vertical depth.

5. That in other respects double and single dead-blocks be made in conformity to the standards heretofore adopted by this Association, as shown in the drawings submitted with this report.

6. The Committee also recommend that the nuts on the ends of the truss-rods be seated in cup washers, so as not to project beyond the surface of the end-sill, and that the space between the ends of the cars be kept as clear as possible of bolt heads or other objects which are liable to catch the clothing or injure those engaged in coupling cars.

Further, the Committee recommend the adoption of the following resolution :

Resolved, That the recommendations of the Committee on Dead-Blocks be submitted to the members of the Association for approval by letter-ballot.

CHAS. BLACKWELL,
G. W. DEMAREST, } Committee.
M. N. FORNEY,

Mr. Soule wanted a change made in the way of explaining dimensions in article 4 of recommendations.

Mr. Cloud thought the place of draw-head was beyond the dead-blocks. Believed the proposed change in height of draw-bar very desirable. The matter of height of dead-blocks was also well considered. The relation between faces when springs were compressed should be decided by the convention, and if carried out would do as much as automatic couplers for the safety of trainmen.

Mr. Adams, while anxious to see all draw-bars of uniform height, did not like the idea of making a change. They had been working for fourteen years to make 33 inches the standard height of draw-bar, yet only one-third of the freight cars had the standard height. The New York Central had already made a change of height and it was not right to expect them again to change.

Mr. Forney said he had spoken to Mr. Buchanan on the subject and found he approved of the proposed change.

Mr. Adams believed that was because the dead-blocks on the New York Central were 4 in. too high now, while their draw-bar was within ⅝ in. of the proper height.

Mr. Forney said he had been very much interested ever since the agitation in favor of automatic car couplers began, and his conclusion was that the safety of trainmen would be greatly enhanced by improvements in the construction of the ends of cars. If leading roads could be induced to adopt standard safety appliances, great influence would be exerted on smaller roads to follow suit. To further this end the committee consulted with representatives of the New York Central, the Pennsylvania, the Baltimore & Ohio and the Erie. The conclusion reached was that uniformity in couplings and their connections could best be secured by changing the standard to 35 inches. One of the lines consulted had a height of 2 ft. 10 in., another 2 ft. 11 in. It is much easier to raise a draw-bar than to lower it. He felt assured that the change would be acceptable to the great majority of roads.

Mr. Adams said it depended on circumstances which change was most easily effected. They are all trying to get the body of a car as low as possible. This is very important in the case of flats, since the lower a car is the more easily is it loaded. Every foot freight is raised represents so much expended energy.

Mr. Wood moved that the recommendations of the committee be discussed in turn, which was agreed to.

First recommendation: that the height of draw-bar be 2 ft. 11 in. for empty and 2 ft. 9 in. for loaded cars.

Mr. Wall moved that this question be submitted to letter ballot.

Mr. Cloud explained that the standard height of the Pennsylvania draw-bar was 35 inches, and he hoped that would be adopted as the standard. He moved to add to Mr. Wall's resolution "that this convention is of opinion that this is a proper standard."

Mr. Hitchcock reminded the convention that they had been working for fourteen years to establish a standard height of draw-bar. It is very important to get a standard height, and it appears further to be the height of folly for the association to give up all that has been already accomplished and go up two inches higher. The roads which wanted the change were those which had paid no attention to the existing standard. He emphatically declared that the East was against this act of retrogression.

Mr. Garey saw no objection to making the change, although he had worked to establish the present standard.

Mr. Hitchcock objected to running foreign cars with high draw-bars among his cars that had not been raised. He did not consider the practice safe.

Mr. McKenna said they owned some 30,000 cars equipped with the standard height of draw-bar, and they objected to change. He asked what advantage was to be gained by a change.

Mr. Cloud answered that trunk lines were competing for traffic, and every effort had to be made to cheapen the cost of transportation. This had led to the use of larger cars and larger trucks. These were new conditions, and it was right to meet the new requirements. While 33 in. was right in 1872, it is not right in 1886, and they were only trying to change to meet the new condition. He contended that the resolution does not force any one to alter existing cars to 35 inches. Springs compress about ½ in. under load, and therefore new cars built 33½ would be 33 in. when loaded. Cars should be built within the limit for the safety of trainmen. Pennsylvania cars have draw-bar 35 in. above rail, and it could not be placed lower with large trucks.

Mr. Miller wanted to know why it was that the Pennsylvania Railroad did not adopt the standard when others adopted it. Most western roads had adopted the standard, and it was not fair that they should be asked to depart from it. The officers of roads naturally object to making changes on the rolling stock. He thought much of the existing diversity in height of draw-bars was due to the kind of trucks used.

Mr. Rhodes thought the Association ought to be extremely careful about adopting standards, and even more so about changing a standard that had been adopted. There is too great a difference between 33 in. and 35 in., and he believed the difference might be reduced. He considered the right way to do was for roads having draw-bars higher than the standard to come down

Mr. Verbryck said one thing put him against the change. Their road had a great through traffic west, and connecting roads would refuse cars if the draw-bars are raised to 35 inches. The Central Pacific have all the draw-bars at standard, and it was not likely they would take cars that were so much above the proper height. Furniture and agricultural implement cars were now about as high as they could be made. Roads would not accept them higher than 14 feet.

Mr. Snow said all their cars were standard and he saw no reason for changing.

Mr. Sutherland was very much opposed to the proposed change. They had been bending all their energies for years to get to the standard, and had succeeded. He saw serious objections to a change that was to mix up the height of draw-bars again. When any one got his fingers pinched in coupling, the railroad commissioners wanted to know if the draw-bar was the proper height, and if the height is wrong any amount of damages will be collected.

Mr. Forsyth saw no mechanical advantage in increasing the height of draw-bars. They have 20,000 cars equipped with M.C.B. axle, and have draw-bars standard height, and they are now asked to change this to accommodate those who have never complied with the standards. He felt sure their officers would never sanction the change.

Mr. Adams said railroad men generally have been coming to regard the work of adoption and maintenance of standards as the most valuable features of the association, and he objected to making any avoidable changes. Cars could be made strong enough to carry the loads called for, and yet have the draw-bars the standard height. He had heard no good reason why a change should be made, and he moved that the matter be laid on the table indefinitely. Carried.

Mr. Cloud moved to amend Section 2, reducing the proposed height of dead-block one inch to suit the standard height of draw-bar.

Mr. Adams moved to lay this section on the table. Carried.

Sections 3, 4 and 6 were approved, and 5 was dropped.

Mr. Cloud moved that the face of the draw-head shall not extend beyond the face of the dead-wood, double or single, when the spring is fully compressed by buffing. He believed that many dead-woods were really of no use, and did not keep the cars far enough apart to take excessive shocks off draw-bars.

Mr. Davenport asked if the change proposed would not alter a standard already adopted by the association?

Mr. McIlwaine asked if this was not a shorthand way of forcing single dead-block men into using double?

Several others objected to the motion.

Mr. Garey moved an amendment that the single dead-wood be omitted, as the pins could not be pulled if the pending motion prevailed.

The amendment was carried, and Mr. Cloud withdrew his motion.

STANDARD FREIGHT CAR TRUCK.

The report on a standard freight car truck was then taken up for discussion.

Mr. Adams wanted to know the cost of a car truck of the design proposed.

Mr. Forsyth gave the following figures as the cost of constructing one standard truck in the shops of the C., B. & Q. at Aurora :

MATERIALS.

1,006 lbs. of wrought iron at 1.73 cents	$18.66
Bolts and nuts	20.24
886 lbs. cast iron at 1.80 cents	15.96
Wheels at $9.35	37.40
39 bearings, 39@12 cents	4.68
Springs at $4.84	9.68
Oak bolster and spring plank	1.44
Oil, waste, paint, coal, etc	1.58
Total	$109.64

LABOR.

Smiths	$8.75
Machinists	5.00
Carpenter and paint	1.51
Total	$15.26

The total cost of the truck, including four 33-in. wheels, is as follows :

Materials	$110
Labor	15
Total	$125

Mr. E. W. Grieves wanted the arch-bars 4 inches instead of 3½ inches wide. He was in favor of something being done at once toward establishing a standard truck that would carry 60,000 pounds. They were making a truck of this capacity, and he was under the impression that other roads were doing so also.

Mr. Cloud did not think any road wanted a truck merely to carry 40,000 pounds. He did not see any advantage of having a standard truck. Standard parts were all that was necessary. They were building a truck to carry 60,000 pounds.

Mr. Wall understood the proposed truck was designed with a view of expanding it easily to carry 60,000 pounds.

Mr. Rhodes moved that the freight truck shown on sheets 1, 3, 4 and 5 be submitted to letter ballot. Carried.

[The truck referred to was illustrated in the NATIONAL CAR BUILDER of July, 1885.]

END PLATFORMS FOR FREIGHT CARS.

To the Master Car-Builders' Association :

Your committee upon the Comparative Advantages of the Two Methods of Constructing Freight Cars with or without End Platforms, beg leave to state that no new facts have been developed since their last report. At that time they gave a careful resumé of the advantages of each of the two methods of construction, and

have not, in replies to circular sent out this year, discovered any reasons that would warrant them in altering their statement.

The committee feel that they completed last year the task assigned them, to wit: "to report upon the comparative advantages of the two methods of constructing freight cars with or without end platforms," and as the members of the association entertain two diametrically opposite opinions, it would seem that the objects of the association would be best attained if the scope of the committee were enlarged, and if they were empowered to submit plans giving two standards for the end floor framing of freight cars.

In the discussion of these two standards, the comparative advantages of cars with and without end platforms would be established, the original intent of our committee would be accomplished, and the association would have a standard for each of the two forms of construction.

EDWARD B. WALL,
W. F. TURREFF,
B. K. VERBRYCK, } Committee.

Mr. Forney moved that the committee be empowered to submit two standards, one with and one without end platforms, the committee being continued and its scope enlarged.

Mr. McWood thought there was very little advantage in having end platforms. No road would adopt them now if hey did not already have them.

Mr. Wall insisted that two standards were proper and necessary.

Mr. Grieves was surprised that Mr. Wall had found no new facts about end platforms since last year, for they had given him the information that they intended to abandon the use of end platforms.

Mr. Wall answered that the reasons given by the Baltimore & Ohio road for changing were not new.

After a little more discussion, the motion was carried.

TREAD OF WHEELS.

Mr. Forney said that at a meeting of the Executive Committee it had been determined to bring the subject of the tread of wheels before the convention. A form of wheel tread had been sent to letter ballot and rejected, and the question now was, would they submit another form of tread?

Mr. Lentz explained that the form of wheel tread submitted was not adopted because the votes were not recorded in time. Sufficient votes were sent in, but some of them were rejected for not being received within the specified time.

Mr. Forney reflected strongly on the apathy displayed by many members in attending to business of this kind. He believed that many of the members objected to the form of tread recommended having so much taper at the outside. He thought it might be desirable to reduce the taper.

Mr. Lentz moved that the form of wheel tread and flange that was submitted to letter ballot be again submitted.

Mr. Forney said that he was generally held responsible for this form of tread, but it was not what he would recommend. This form of tread had been submitted twice to letter ballot and rejected, and he thought it idle to submit the same thing again. He considered it advisable to discuss the matter thoroughly now. He preferred ¼ inch radius at throat at flange; others were striving for ⅜ inch.

Mr. Marden said they had discussed the subject of tread of wheels and rail sections at the New England Railroad Club where permanent way engineers participated. He found there was as much diversity of opinion among permanent way men respecting the proper form of rail section as there was among car builders regarding the best form of wheel tread, but there was a tendency to make rail heads more rounding.

Mr. Adams urged the members to answer letter ballots. He did not regard the difference between ¼ inch and ⅜ inch radius as of any consequence. He laid more stress on having the wheels of uniform diameter. Wheels vary from 32 to 33 inches in diameter. There is a standard chill mold, but half of the railroads have not changed their patterns.

Mr. Rhodes said his road was not entirely satisfied with the form of tread recommended. They had no objection to the radius at neck of flange, but they objected to the tapered portion. They made tests with different forms of treads and found they got best results from those having a slight cone.

Mr. T. A. Bissell's experience made him favor a coned tread. He had heard of considerable trouble with flanges, resulting from the use of cylindrical treads, when coned wheels would run satisfactorily. In England, where great attention has been paid to the wear of wheels, it is found that coned treads give the greatest wear.

Mr. J. D. Barnett, president of the Master Mechanics' Association, was introduced by President Verbryck to the meeting.

Mr. Cloud said their road voted in favor of the tread recommended, but he preferred it to be slightly coned.

Mr. Davenport said they had tried twice to get a cylindrical tread adopted and failed. There was a disposition among the members to have the tread coned. He believed a radius of ⅜ inch in throat of flange would give better results than ⅝ inch, as flanges would wear longer. Those who have followed discussions in the railroad papers on wheels and rail-heads (see NATIONAL CAR-BUILDER) will see that good points have been made against matching head of rail with flange of wheel.

Mr. Marden considered the shape of rail important in relation to wear of wheels. It was obviously the sharp corner of rail that cut the wheel flange. This being so they should get maintenance of way men to favor a rail head that fitted neck of flange.

Mr. F. M. Wilder said that 5 per cent. of the 16,000 wheels removed annually from Erie cars were for sharp flanges.

Mr. Marden favored the form of wheel proposed because its tapered part prevented chipping.

Mr. Grieves favored a coned tread, but was willing to accept ⅜ inch radius of throat.

Mr. Mackenzie moved that a tread having ¼ cone to 4½ inches be adopted.

Mr. McIlwaine said that in Canada where the train service was trying on wheels the tapered form had prevented 50 per cent. of the chipping, and it was easier on frogs than the old form.

The form of tread proposed by Mr. Cloud was then adopted. It is the form proposed last year, slightly altered to make the cylindrical portion conical.

STANDARD BRAKE SHOE.

Mr. Forney intimated that the executive committee had agreed to recommend that the Christie & Collin shoe be both sent to letter ballot for adoption as standards.

Mr. Cloud and several other speakers preferred a single standard, but when that could not be agreed upon, they would prefer two rather than a great many.

Mr. J. T. Chamberlain moved that both be sent to letter ballot.

Mr. C. A. Smith objected that the establishing of two standards would introduce a bad precedent. He also spoke in favor of the majority ruling.

Mr. Marden moved as an amendment that the Christie head be also admitted to ballot as a standard.

Mr. Grieves said that his road had adopted the Christie shoe since last year.

It was finally agreed to send the Christie shoe alone to letter ballot.

NOMINATION OF OFFICERS.

The committee on nomination of officers for the ensuing year reported:

For President, B. K. Verbryck; Vice-Presidents, Wm. McWood, John W. Cloud and E. W. Grieves; Treasurer, John Kirby. For Executive Committee, to serve two years, F. D. Adams, L. Packard and E. B. Wall.

All the officers nominated were subsequently elected.

REPORT ON CAR COUPLERS.

The executive committee made a long report on car couplers. After dwelling upon the arrangements for the Buffalo tests and the service tests subsequently made, the report concludes as follows:

"The reports which have been received up to this date from the couplers already in service are necessarily incomplete, and, in fact, we have received reports from only five couplers on a few lines after but short service, and it would be manifestly useless to burden this report with such incomplete details. The trial in service is, however, progressing, and if the Association thinks it proper, we would suggest that the matter be continued with the Executive Committee to complete what they have already begun, and to consider only such as to them seems best of new and improved couplers which may be brought to their attention and which to the committee appear to give promise of an outcome beneficial to the railroads of the country. In reviewing the present state of the automatic coupler question, this committee feels grave doubts as to whether there is to-day available any automatic coupler which a railroad company would be justified in applying to its cars. For inasmuch as other roads would inevitably apply other couplers, we believe that the danger of trainmen in handling cars would be increased, owing to the vast interchange of cars arriving on different roads, and that the cost of maintaining car couplers to the roads themselves would be greatly increased. Until the time, therefore, when the principle of the survival of the fittest, aided by such feeble efforts as we and others are able to give, we think the safest course for railroad companies to pursue is the conservative one of retaining the old general style of coupling, and we earnestly recommend that the energies of this Association at this time be devoted to accepting and getting into practice, as speedily as possible, uniformity in style and construction of draw-heads and dead-woods, believing as we do that we will thereby be pursuing the wisest course for the present to save employés of railroads from bodily injury. For the future, however distant it may be, we hope to see a form of coupler which will be safer for trainmen to be, but we think that the way to its development will be through the application of the best of the car couplers prepared to a reasonable number of cars rather than by the general use, whether enforced by law or otherwise, of couplers which have not been sufficiently proven beforehand, and out of all the couplers which have thus far been brought to the attention of this committee, as mentioned in the previous part of this report, we would recommend to the Association as most worthy of trial in sufficient numbers to demonstrate their ultimate worth, the McKeen coupler, the Marks and Archer, if arranged to couple automatically with each other; the Ames coupler, the Janney, Thurmond and Dowling, if arranged to couple automatically together. Your committee thinks that the above-named couplers represent among them the type which will ultimately prove successful, and if the Association will sustain our recommendation to continue the committee and investigate the question further during the coming year, we will consider only such new couplers as may be recommended for trial by five members of the Association, and that will couple automatically with the one or the other of these four types, unless very powerful reasons, which appear good to the committee, are given for some new type. After a most careful consideration of the subject, we are impressed with the fact that no aid can be given in settlement of this question on the safest basis and with the least loss of life and limb in the meantime by the Association, unless you are willing to consider the matter from a purely mechanical standpoint first, as, otherwise, increased cost of maintenance will inevitably annul all differences in first cost, and at the same time result in greater injury to your trainmen. The committee regrets that it has not been able to do more toward the development of this question during the past year, but we have had no power to avert the delays, and the matter is now left in the hands of the Association, feeling sure that it will do its utmost in furtherance of the safe and practical settlement of the question of coupling cars, and with a greater weight as well as a more sincere regard for the safety of trainmen than can be had by the general public, whose intentions are doubtless good, but whose actions, as expressed in State laws on the question of car couplers, are already still further endangering the employés of the roads you represent in their arduous duties."

After the report on car couplers was read, a day was devoted to disussing the Rules of Interchange of Freight Cars. When that wearisome ordeal and somo other business was concluded,

Mr. Marden asked the executive committee to state their reasons for excluding by their report the further experimenting with couplers of the Miller type.

Mr. Verbryck could not tell why the decision was made.

Mr. Adams said there were circumstances connected with the tests that the committee were not prepared to divulge. They were still engaged in investigating the subject, and thought a full explanation would be premature.

Mr. Marden said the committee had no report on the performance of the couplers selected at Buffalo, yet they excluded all but seven from further trial. He questioned the right or utility of excluding part of the couplers without giving the reason for so doing. If the Ames coupler had been rejected he believed Mr. Adams would have wanted to know the reason why. The Miller coupler had given satisfaction on passenger equipment and he thought it was likely to do well on freight cars. The Fitchburg road had found the Cowell coupler worked well on freight cars, and they did not feel disposed to give it up.

Mr. Rhodes said the executive committee have not made their final report yet, and we do not know what reasons. they may have for their action. He did not wish to hamper the executive committee by urging explanations.

Mr. Garey was surprised at the Miller type being rejected and the Janney type retained. It looked to him like an attempt to exclude all but the Janney type.

Mr. Keeler understood that the whole twelve couplers were to be continued or he would not have moved to accept the report.

Mr. Verbryck said that some of the couplers retained had never been put on trial. The Dowling coupler had been assigned to their road, and although he had made every effort to get the couplers applied, he had not been able to get one on. The coupler company were experimenting to get it to couple with those of the Janney type, and there was always something unsatisfactory that prevented the couplers from being sent on.

Mr. Geary asked if it were not a fact that the committee ad recommended a coupler that had never been tested in hervice.

s Mr. Lentz said that the Gifford coupler, assigned to the Lehigh Valley road, had not yet been furnished to the railroad company.

Mr. Keeler moved that the association instruct the executive committee to assign the Cowell coupler to the Detroit, Lansing & Northern road for trial. Carried.

The subject then dropped.

TREASURER'S REPORT.

Balance on hand at beginning of last year	$1,013.81
Collected during the year	3,238.41
Total	$4,252 22
Disbursements during the year, including Secretary's salary	$4,147.61
Balance on hand	104.61
Total	$4,252.22

AMENDMENT TO THE CONSTITUTION.

Mr. Blackall moved that the consideration of the proposed amendment to the constitution be postponed till next year. Carried.

MAXIMUM OUTSIDE DIMENSIONS OF FREIGHT CARS.

No report on this subject was prepared, and it was moved that the subject be continued and a new committee appointed. Carried.

REPORT ON SLIPPING OF WHEELS OF BOTH PASSENGER AND FREIGHT CARS.

To the Master Car-Builders' Association:

Your Committee, appointed to report on appliances to prevent slipping of wheels of both passenger and freight cars, have from investigation and replies received in answer to circular of inquiry, learned of the following appliances for this purpose:

1. Is a device furnished by Robert Miller, Assistant Superintendent of Michigan Central Railroad, which was planned and constructed in the shops of the company, and is reported to have been in successful operation for two years past.

The accompanying illustration of the device is explained by Mr. Miller, as follows:

The drawing shows a freight car truck, but the construction is similar in a passenger car truck. The power in that case emanating from the air cylinder instead of brake shaft.

Whenever the strain in braking becomes so great as to effect a friction between wheel and rail, the chain will be clamped and held immeaiately, so that no additional strain on the brake-rod, however great it may be, can be transferred to the brake lever. Pulley *a* and *b* are pivoted to an arm fixed upon the channel bar. Pulley *c* is pivoted to the forked end of the floating bar *d*, which is hooked over the crank-arm *f*, fulcrumed at *g*, on an iron plate riveted to the channel bar, and is provided with a sleeve affording a seat for one end of the swing hanger-bolt. The length of the crank and the distance between the center of the bolt and fulcrum of lever must be arranged according to the weight of the empty car, and due allowance must be made for friction, and in such a proportion that the crank-arm will be pulled over whenever the strain on the rod is pressing the shoes against the wheels with a force of about four-fifths of the friction between the wheel and rail at the ordinary condition of the track.

It will be seen that the braking is actually done in the usual way, the attachment coming into operation only whenever and as soon as any overstrain is brought upon the rod; just at the instant when the strain would become dangerous, the crank will be pulled over. The resistance of the weight of the car being no longer able to hold the same, the floating bar and the pulley pivoted in the fork, will instantly travel forward and wedge itself between the two fixed pulleys, thereby locking the chain absolutely, so that all further strain will affect that part of the brake connection only which lies between the power and the lock. This attachment limits the force of the braking, being an automatic brake to the brake.

The crank-arm will average three or four times the length of the lever by which the hanger-bolt is raised; therefore, while the pulley on the floating-bar travels 2 inches to lock the chain securely, the one end of the hanger-bolt is lifted about ½ an inch. This way the end of the bolster is lifted about ¼ inch, and the center of one end of the car about ⅛ inch.

Thus we have a simple, cheap and automatic contrivance, by which we apply more power to the heavily-loaded car than to the empty one, and this in accurate proportion to the load.

2. Is a patented device, consisting of a strong steel coil spring inserted in the bottom connection or lower brake rod. When the pull is greater than the strength of the spring, the latter yields. This was tried on some sleeping cars on the Lake Shore & Michigan Southern Railroad, and reported by Mr. Kirby, General Master Car-Builder, as overcoming the difficulty in part only.

3. A device fitted to a baggage car on the Chicago, Milwaukee & St. Paul Railway, consisted of two sand boxes, one placed immediately behind the front truck and the other in front of the back truck, and arranged so as to automatically throw a stream of sand upon the rail when the piston of the brake cylinder had reached a certain point.

4. E. B. Wall, Superintendent of Motive Power, Pittsburgh, Cincinnati & St. Louis Railway, reports that they have fixed a maximum pressure for engineers to carry on passenger trains.

While this pressure is great enough to slide light trains, it is nevertheless as near the average as they could attain. They endeavor to hold the engineers to it, and discipline them when it is exceeded. To get the results of what the engineers are actually doing, they have placed in one of their baggage cars an Edison recording gauge; this gauge is provided with a roll of paper upon which is drawn a line showing the pressure at all times from one end of the line to the other, and indicates very clearly what pressure is being carried by the engineer, and whether he maintains it regularly and makes good or bad stops. Herewith are some of the diagrams furnished by Mr. Wall.

5. R. H. Soule, Superintendent Motive Power of the New York, Lake Erie & Western Railway, says, when connected with the Northern Central and Baltimore & Potomac Railroad, they were considerably troubled on account of sliding wheels under baggage and express cars. These cars were shorter and lighter than the coaches, yet had the same brake leverage. They devised a special automatic cut-off valve which was placed between the auxiliary reservoir and the brake-cylinder under each baggage and express car. These cars were first experimented with in the yard, and a maximum pressure thus determined under which these brakes could be applied without danger of slipping the wheels. The automatic cut-off valves were then set at that point, so that whatever pressure might be carried on engine it would be automatically cut off when it reached the maximum allowable under each car.

The results, he believed, were satisfactory, inasmuch as for full six months, as far as he could remember, they did not have a single case of a slid wheel under baggage and express cars.

One member reports having reduced the pressure from about 80 pounds to 60 pounds in the use of atmospheric brakes, and finds they can handle their trains fully as well; and it has done away almost entirely with slid wheels.

Among the suggestions offered are the following:

One member suggests the use of dead levers, wherever they can be used, and brakes on eight wheels under all eight-wheeled cars.

Two suggest that the leverage be proportioned to the weight of the car, less 20 per cent., and if atmospheric brakes are used, limit the pressure by an automatic governor, such as is used by the Westinghouse Company.

Others suggest reducing purchase of brake levers.

Except in the first-mentioned device there is no provision made to overcome the variation in the weight of individual cars, when loaded and empty. This would seem to be an important consideration in any device that is to be made thoroughly effective, as brakes, given the maximum power and so adjusted that they could be applied without danger of slipping the wheels under a load of 40,000 pounds, would be little or no protection against sliding them when car is empty or partly loaded.

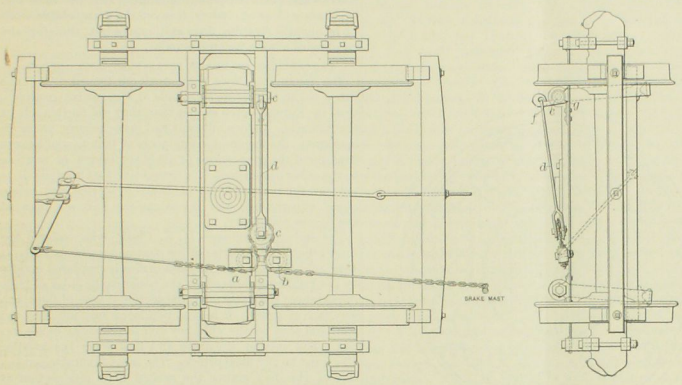
Your committee has not learned enough of definite and reliable results from the use of the appliances reported to warrant them in expressing an opinion as to their merits. In view of the importance of the subject we trust there will be a full discussion, and would recommend its further consideration by a new committee.

M. P. FORD,
H. H. ROBERTS,
J. P. COULTER,
} Committee.

Mr. W. A. Scott regarded this as a very important subject, and hoped it would be continued for further investigation. He did not know of any subject more worthy of all the consideration it could receive from the association.

Mr. Marden said they experienced considerable trouble with wheels getting flattened by slipping. He had made several modifications of the brake leverage as recommended by the Westinghouse Company, but did not obtain entire immunity from slipping. Lately their superintendent of motive power had issued orders reducing the pressure of air to be carried by engineers. Thinks there will not be so much trouble in future.

Mr. Kirby wished to hear from members in charge of



BRAKE ATTACHMENT.

See Report of Committee on Shipping of Wheels.

motive power particulars of air pressure carried. He understood there was great diversity in the pressure carried. Some roads carried 70 pounds and others all the way to 90 pounds, and he understood that 70 pounds pressure did the work just as efficiently as 90 pounds. As to leverage he used 3 to 1, and the cylinder lever was 30 inches long, with hole in center for heavy cars. For light cars, the cylinder lever was changed to 20 and 10 inches. Thinks that unless the air pressure at locomotive is regulated for light and heavy cars they can do little with levers to prevent sliding.

Mr. Blackall moved to bring the suoject before the Master Mechanics' Association for co-operation in preventing wheel-sliding. Thought it would be a good plan to request them to put safety-valves on main reservoirs to prevent over-pressure.

Mr. Forsyth pointed out that the extra pressure carried on the main reservoir is utilized for the purpose of releasing the brake promptly.

Mr. Snow suggested that a safety-valve be put on between the auxiliary reservoir and brake cylinder.

Mr. Marden said they experienced no difficulty in releasing brakes without carrying extra pressure.

Mr. Kirby wished members to edify the meeting by telling what they knew about brakes. He objected to the high air pressures carried on some roads and saw no use for it. He also drew attention to the inconvenience experienced when an engine carrying a low pressure took hold of a train that had been operated by an engine having high air pressure. Believed that the trains noted for causing flat wheels were those having fewest stops. He thought this resulted from the engineers not keeping up an even air pressure. If the pressure on triple valve is not controlled by even pressure, it will control the engineer.

Mr. McIlwaine had paid great attention to the subject of wheel-sliding, and by a judicious arrangement of levers had reduced the damage from that source 75 per cent.

Subject continued with new committee.

REPORT ON STANDARD HEIGHT OF DRAW-BARS FOR PASSENGER CARS.

To the Master Car-Builders' Association :

Your Committee on revising the height of Miller draw-bar respectfully submit the following report:

We find, on investigating this question, that at the Convention, held in Chicago in June, 1869, thirty-six (36) inches was recommended as the standard height of draw-bars for passenger cars, and at the Convention, held in Richmond in June, 1871, the height was fixed at thirty-three (33) inches.

In order to ascertain what the practice is at the present time, your Committee issued a circular asking the following questions :

1. Do you use Miller draw-bars upon the cars run in your passenger equipment ?

2. If yes, will you please state how many cars you have which are so equipped ?

3. Also, please state what is the standard height of these draw-bars as adopted by you, measured from the level of the top of rail to the center of the Miller draw-hook ?

In answer to this circular, we received replies from one hundred roads, representing twelve thousand and seventy-nine (12,079) cars, equipped with the Miller draw-bar.

1 road, representing	6	cars, height of draw-bar,	32	inches.
19 roads, "	2,452	" " "	33	"
2 roads, "	46	" " "	33½	"
26 roads, "	4,387	" " "	34	"
5 roads, "	1,195	" " "	34½	"
19 roads, "	2,472	" " "	35	"
1 road, "	310	" " "	35⅛	"
5 roads, "	581	" " "	36	"
2 roads, "	630	" " "	36½	"

An average height of 34¾ inches.

In view of the fact that some roads are using wheels larger in diameter than formerly, your Committee does not think it advisable to recommend the standard of thirty-three (33) inches proposed at Richmond; nor do we approve of thirty-six (36) inches, as was proposed at Chicago.

As a compromise measure, and one that will meet the average height of draw-bars on cars now running, we recommend that the standard height of draw-bars for passenger cars be thirty-four and one-half (34½) inches from the level of the top of rail to the centre of the hook.

JNO. S. LENTZ,
ROBT. MCKENNA,
} Committee.

NEXT PLACE OF MEETING.

Several places were proposed for the next place of meeting, but Minneapolis or St. Paul was finally settled upon, the executive committee to decide when they found out which of the two cities would be most convenient.

After some other formal business of no special interest, the Convention adjourned.

Invention and Appliances Exhibited at the Master Car-Builders' Convention.

Finlay's Central-Support Car Truck—model ; Rice's Molding Machine—working model ; Damascus Bronze Co., several specimens of metal ; Henry Roberts' woven wire car seats ; Henn's Sliding Safety Roof for cars—working model ; Clark's Equilibrium Window Fastenings ; Smith & Owen Heater Co.'s Car Heater ; Dooley Automatic Car Oiler—model ; L. S. Colburn's Combined Wood and Paper Brake Shoe ; Winton's Magnetic Window Shades ; Paragon Anti-Friction Door-Hanger, Dunham Mfg. Co. ; Gardner's Three-ply Car Panels and Ceilings ; Detroit Car Door Fastener ; Hale & Kilburn Mfg. Co.'s Car Seats ; M. N. Forney's Concave Car Seats ; Suzenal's Anti-Friction Side Bearing ; Hawkins' Patent Jack, worked by a ratchet motion ; the Cowell Car Pusher ; E. L. Bushnell's Car Seat and Mattress Springs ; Brunswick Steel-Tired Wrought Iron Spoke Wheel ; Oneida Community's Nickeline Car Fittings ; the Thurber Steel Wheel, Brook's Locomotive Works ; the Dickson Steel Wheel, Dickson Mfg. Co. ; Vulcanized Fiber Co., Washers and Dust Guards ; Pittsburgh Steel Works, Drawings of Springs, etc. ; D. F. Van Liew's Grain Doors ; Clough's Sliding Doors for baggage, mail and express cars ; McKeen's Automatic Sash Lock ; Moore Mfg. Co., Chicago, Freight Car Door ; Wagner Car Door ; also Hewitt Car Door ; Hutching's Frameless Roof for Cars ; Concave Elliptic Springs, Concave Elliptic Spring Co. ; Hot Water Heating Apparatus, McEwan & Co. ; Martin's Anti-Fire Car Heater ; "Common Sense" Oiler, U. S. Car Axle Lubricating Co. ; "Tropic" Fibrous Waste, Lacovia Mfg. Co.

CAR COUPLERS.

Aikman Automatic ; Perry ; Westbrook & Cook ; D. N. Graveline, automatic link and pin ; Janney ; McKeen's Improved ; Marks ; Barnes ; Lorraine ; Thurmond ; Cowell ; Coolbaugh ; Jones ; United States ; Ball-Joint ; New Era ; Yeatman ; Van Dostan ; Herrington ; Robinson, and several others.

Lehigh Valley Special Train.

THOSE attending the Master Car-Builders' Convention were accommodated with a most comfortable special train, provided by the Lehigh Valley Railroad. The train consisted of five cars, two of which were handsome coaches provided by the Worcester Excursion Car Company, the remainder being the finest cars belonging to the Lehigh Valley road. The train left Jersey City on Monday morning, and in returning left Niagara Falls on Friday morning. Both trips were run very fast, and the numerous passengers freely expressed the pleasure they enjoyed in viewing the beautiful scenery traversed. Mr. R. H. Wilbur, assistant superintendent of the road, accompanied the train both ways, and was unremitting in his attention to the passengers. His efforts in promoting the comfort of the excursionists were zealously seconded by Mr. Shuey, superintendent of the Worcester Car Company, and by Mr. J. S. Lentz, master car-builder of the Lehigh Valley Railroad. During the return trip resolutions were passed thanking these gentlemen and the companies they represent for the courtesies extended to the Master Car-Builders and their friends.

The following resolutions were adopted at a meeting of the master car-builders and invited guests:

We, the participants in this excursion by special train from Niagara Falls to New York City, on this 11th day of June, 1886, do most cordially unite in the following resolutions:

Resolved, That we, the members of the Master Car-Builders' Association, the ladies accompanying them and the other invited guests on this special train, do hereby express our hearty thanks to those who have organized and managed this most delightful excursion.

We appreciate the liberality of the management of the Lehigh Valley Railroad Company in making its invitation so generously inclusive; in transporting us, as its guests, through three States, and in giving us the opportunity of viewing the scenery of a district which is appropriately called "the Switzerland of America."

We recognize the generous kindness of the Worcester Excursion Car Company, which, through its superintendent, Mr. W. H. Shuey, placed two of its very comfortable cars at our service.

And we desire to give a special and emphatic expression of thanks to Messrs. W. P. Wilbur and J. S. Lentz for their unwearied and most successful personal efforts to make this trip altogether enjoyable.

Resolved, That the secretary be instructed to forward copies of these resolutions to the parties named or referred to therein.

(Signed) GEO. HACKNEY, Chairman.
GEO. W. MORRIS, Secretary.

A REMARKABLY fast run was made over the Great Western Division of the Grand Trunk road by the special train which took the western members of the car-builders' convention on their way home after the adjournment. The run was made from Niagara Falls to Windsor, a distance of 229½ miles, in 237 minutes, excluding stops, and at a uniform speed of 60 miles an hour, except upon a 11-mile grade. Luncheon was served on the train at London, speeches were made, and resolutions adopted congratulating Mr. J. D. McIlwain, superintendent of car department of the Great Western Division and chairman of the convention reception committee. The members expressed great admiration at the magnificent running.

Revised Rules of Interchange.

Our last issue contained the report of the committee appointed last year to codify these rules. The report was revised by the Executive Committee and then submitted to the Association for approval, when the following alterations were made :

In Rule 3, section 4, the minimum diameter of journals was, after considerable discussion, finally fixed as follows :

60,000 lbs. car	Unit.	3⅝ in.
50,000 "	"	3¾ in.
40,000 "	"	3⅞ in.
30,000 "	"	2¾ in.

Rule 13 as proposed by the committee was renumbered as Rule 12, and after giving a schedule of prices for new, second-hand and scrap material, was modified as follows :

"And with an additional charge of $1.50 for each pair of wheels and axles removed from the truck."

The form of bill for wheel and axle work was finally amended as follows:

.....

To..... R. R. Co., Dr.

For wheels and axles used under ....cars. Month of....188..

Date and place	Initial, kind and number of cars	Wheels or Axles removed: Maker	Date cast	Number	Cause of removal	Shop marks on wheels or axles	Wheels and Axles Applied: Maker	Date cast	Number	New or second hand	Net material charge	Labor charge	Total net charge

Rule 16 as originally proposed becomes Rule 15, and a new Rule 16 was adopted as follows :

"Rule 16. Wheels on same axle must be of the same circumference.

"New wheels must not be mated with second hand wheels.

"Prick-punching or shimming the wheel-fit must not be allowed.

"Wheels applied must be marked on inside with date of application.

"The wheel seats of foreign axles must not be reduced to fit wheels, but the wheels must be bored to fit axles."

No alterations of any moment were made until Rule 22 was reached. A new style of car, the 50,000 lbs. hopper-bottom gondola, was added. The length of the longest cars was modified to read "32 ft. or over" instead of "33 ft. or over." As the rule stood, no provision was made for cars over 32 ft. and under 33 ft. long, an obvious omission. The rule as finally amended reads as follows :

"Rule 22. The settlement prices for new cars and trucks shall be as follows ;

Box car, eight wheel, 32 ft. long or over	$450
" " " " under 32 ft. long	430
Stock car, eight wheel, 32 ft. long or over	450
Stock car, eight wheel, under 32 ft. long or over	435
Gondola car, eight wheel, drop-bottom, 20 tons	400
" " " " " 15 " " less	375
" " " Hopper bottom, 25 tons	450
" " " " " 20 " or over	425
" " " " " 15 " " less	400
" " " plain, 32 ft. long or over	325
" " " " under 32 ft. long	300
Flat car, eight wheel, plain, 32 ft. long or over	300
" " " " under 32 ft. long	290
Box car, four wheel	230
Coal car, four wheel, ordinary	200
Gondola car, four wheel, drop-bottom	300
Trucks, car, four wheel, 1 pair	200

"Depreciation due to age shall be estimated at 6 per cent. per annum upon the yearly depreciated value of bodies and trucks; provided, however, that allowances for depreciation shall in no case exceed 60 per cent. of the value new."

It will be observed that the alterations in prices are small, and all tend to show a reduction in the value of rolling stock.

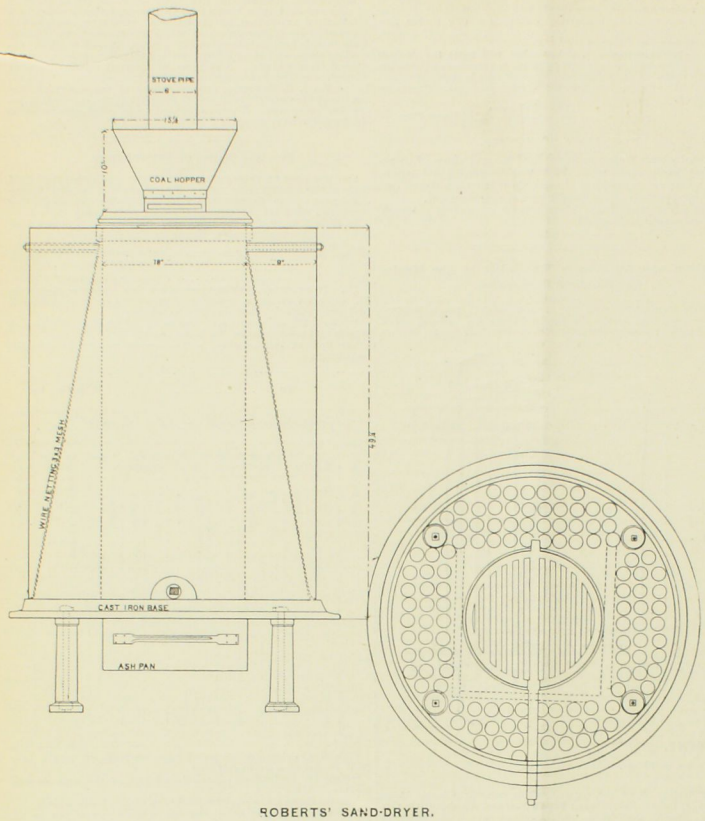
The following addition was made to Rule 25 :

	Charges.	Credit.
One box or stock side-door	$5.00	....
One box or stock end-door	3.00	....

After considerable discussion, the words in italics were added to Rule 29 :

"In case of any dispute or question arising under these rules, the same *may, by mutual consent*, be referred to the Executive Committee, whose duty it shall be to decide the case."

A SUIT filed in the United States Circuit Court by George Woodford for $500,000 reveals a characteristic piece of sharp practice where one rogue got worsted by revealing a fleecing scheme to another. It appears Woodford got into litigation with the St. Louis & San Francisco road over property he had which the track was built through. During the inquiries connected with the case, Woodford discovered that a flaw existed in the incorporation of the company. He planned to incorporate a new company himself to build a road on the line occupied by the St. Louis & San Francisco, and revealed to Jay Gould the whole scheme in the expectation that Gould would advance the money to work it out. Instead of doing that, Gould, it is alleged, used the information he had obtained to intimidate the St. Louis & San Francisco and prevent them from building into St. Louis, and induced them to use the Missouri Pacific tracks instead.



ROBERTS' SAND-DRYER.

WE are indebted to Mr. E. M. Roberts, master mechanic of the Ashland Coal & Iron Railway, for blue prints from which the engravings were made. Of the sand dryer, Mr. Roberts says: "It is the best and most economical sand dryer I have ever seen. It was designed by Mr. W. H. Thomas, superintendent of motive power of the East Tennessee, Virginia & Georgia Railway, and is universally used on that system, where it gives the utmost satisfaction. As you see, the sand does not come in direct contact with steve, burning and baking the sand and damaging stove, but is situated so as to get the benefit of all the heat, and when dry falling through the netting to the floor with a constant feed. They experience no difficulty in supplying with sand all the engines on the Huntington division, by running this dryer less than two-thirds of the time, whereas, with the old furnace pans they were not able to keep up with the demand.

"Mr. Thomas has transferred his right in the dryer to myself, and we will soon be prepared to furnish them at a low price to any roads desiring them."

Seeing Both Sides of the Joke.

Apropos of railroad practical joking, there is no species of would-be wit more stupid or hazardous, yet it is freely indulged in by many railroad trainmen. Jim Williams, an engineer on the Rock Island road, was an inveterate practical joker, and the sells he was in the habit of perpetrating on the grangers was a source of endless amusement to the trainmen. One day Jim was standing with his engine at Davenport. An extremely green-looking specimen of a country youth came up, and confided the information that he would like to be an engineer, and asked Jim how he had best proceed to get in the way of learning the business. "Why," exclaimed Jim, "you are the very man I've been looking for three weeks. Have you got any money?" The youth admitted that he had a few dollars, and Jim directed him to go at once and buy a suit of blue overalls and come back to the engine. Overjoyed, the countryman got the overalls, and Jim set him to work scraping the tender running gear, hurrying him on by saying that hard work was needed to secure him a permanent job. The youth toiled at the work for three or four hours, till it was time for the engine to pull out. Jim then told him that he might go home now, and return at the same time next day. At the time appointed the youth appeared, but the engine was not there, and after waiting for several days, he became convinced that the engineer had been deceiving him, so he walked into the office of Mr. Kimball, the superintendent, and stated the case. Mr. Kimball appreciated the joke and detected the joker. He told the youth to come back in two days and Jim Williams was directed to attend at the same time. Engineer and would-be engineer recognized each other readily enough when they came together, and Mr. Kimball saw there was no mistake. "Now, Jim," he said, "let us see how much you owe this young gentleman. You have taken up about a week of his time, which we will put down at two dollars a day, and you got him to buy a suit of overalls by false pretenses. Let us call it fifteen dollars even. Now, Jim, pay that bill or go and take your time." The bill was promptly settled, and the sequel of Jim's joke was considered the funniest thing he ever contributed to fan the hilarity of the Rock Island trainmen.

Meeting of Mechanical Engineers.

The American Society of Mechanical Engineers held their spring meeting at Chicago, beginning May 25. There was a large attendance of members, and close attention was given to the business on hand. The only subject introduced that was of interest to railroad men was, "What is the maximum safe load for steel tires on steel rails? Can this be expressed in terms of the crushing strength of the tire and rail, and per inch of width for different diameters of tires?"

Mr. Henry R. Towne, Vice-President, gave some particulars of the experiments made by Mr. Chanute on the Erie Railroad some years ago, to find out the area of contact between tire and rail. It was shown to be extremely small—only a line.

Mr. Angus Sinclair believed the deductions made by Mr. Chanute from his experiments had done more harm than good. The limit of safe load for a tire was fixed at 12,000 pounds. Carrying the theory into practice that this limit could not safely be exceeded led to excessive slipping of driving wheels, which caused more injury to tires and rails than the rolling friction of heavier loads. On roads where Mr. Chanute's limit was greatly exceeded, and locomotives did their work without slipping, less injury resulted than on roads where the weight on drivers was strictly limited. There is undoubtedly a limit to the weight that can economically be placed on drivers, but it has not yet been clearly ascertained.

Mr. Horace S. Smith, Joliet Steel Works, said he had subjected rollers of cast steel, 3 inches diameter and 4 inches face, to a weight of 15,000 pounds without injury.

The members were urged to give any information their experience might have revealed bearing on this important subject, but nothing of any consequence was brought out.

Locomotive Draft Appliances.

BY ANGUS SINCLAIR.

EVOLUTION OF DOUBLE NOZZLES.

The application of a petticoat pipe as a means of regulating the draft through the flues, and of keeping the smoke-box clear of cinders, entailed the placing of the exhaust orifice at the bottom of the smoke-box; and putting the opening in that position required the use of double nozzles. The long petticoat pipe and double nozzles are inseperable. A single low nozzle has never been employed successfully. The two exhaust pipes have to be joined so abruptly when a low nozzle is used, that the steam passing out of one exhaust passage has a strong tendency to blow into the other, causing excessive back pressure in the cylinders.

Among the early generations of American railroad mechanical engineers, ideas of economy in operating exerted little influence on construction or design. They paid much more attention to any arrangement or device that would save some labor or contribute to the comfort and convenience of the men handling locomotives. As the low nozzles and petticoat pipe combination kept the flues and smoke-box clear of cinders, it saved the disagreeable work of frequently cleaning flues and smoke-box, therefore the combination soon became popular.

PROPORTIONS OF DRAFT APPLIANCES USED ABROAD.

The inexorable laws that work out the survival of the fittest began to operate on details of locomotive construction in Europe much earlier than they did on this side of the Atlantic. Before railways had been twenty years in operation, the locomotive engineers of Britain and France discovered the proportions of draft appliances in relation to the other dimensions of a locomotive that were likely to produce the most economical results in service, and subsequent experiments and investigations have not changed the figures materially.

The eminent engineer, D. K. Clark, who collated the most reliable discoveries of his contemporaries as early as 1850, said that the area of blast orifice is regulated mainly by the following elements of the boiler in the order of their importance; the grate area, the sectional area of flues, the air space of grate. It is also regulated very much by the sectional area of the chimney and the capacity of smoke-box. The smaller the grate and flue ways the smaller also must be the blast orifice. The most favorable proportion of chimney giving the widest blast pipe, is that of which the sectional area is $\frac{1}{12}$ of the grate area, and the capacity of the smoke-box should be about three cubic feet per foot of grate area. The blast orifice should terminate considerably below the bottom of the chimney, at a difference of level equal to the diameter of the chimney or nearly so, according to the form of the entrance. In boilers where the flue area is $\frac{1}{4}$ of the grate area, the blast orifice should be $\frac{1}{9}$ of the grate area. To suit the engine, the exhaust opening must be large enough to admit of free exhaust, to suit the boiler it must be small enough to create the necessary draft. Now, an orifice $\frac{1}{15}$ the area of piston is abundantly large for the engine, and an orifice $\frac{1}{6}$ of the grate area is sufficiently small for ordinary boilers. But for margin allow for the greatest area of blast orifice only $\frac{1}{8}$ of the grate. The orifice must then be not less than $\frac{1}{72}$ of the piston and not more than $\frac{1}{8}$ of the grate, and to reconcile those conditions the piston should be not more than $\frac{1}{4}$ of the grate because $\frac{1}{9} \times \frac{1}{8} = \frac{1}{72}$.

The employment of the petticoat pipe and low nozzles prevented American master mechanics from regulating their designs by the foregoing data, which for years comprised the best European practice, but those among us who are now using the open stack and its proper adjunct, the single exhaust nozzle, will still find the particulars respecting proportions of nozzle area to flue section and grate area to be useful for reference, for they are still applied to successful locomotives. But to burn the inferior fuel so often used in America, larger grate area and flue section is neces-ary.

It is often fortunate for the interests of railroad companies when lucid rules that can easily be comprehended by non-scientific men are applicable to the calculation of leading locomotive proportions. Had the rules laid down by Clark nearly forty years ago been made articles of faith by the past generations of locomotive designers and master mechanics, a world of the trouble that resulted from making the boilers too small for the cylinders would have been prevented. We would also have heard less about the fire-box being so much superior to the flues for steam making, and the mechanical heterodoxy that resulted from this idea being too fondly nursed would have brought less reproach upon its disciples.

SMOKE STACK PROPORTIONS.

A recognized rule in smoke stack designing among us is to make it one inch less than the diameter of the cylinder. That does fairly well for a diamond stack and double nozzles, but it is not a philosophical way of designing dimensions, and does not suit well for an open stack. The function of the stack is to pass out the gases that are drawn through the grates and flues, and it ought to bear some relation to flue section or grate area. A single nozzle, to perform its functions to the best advantage, must be capable of delivering the exhaust steam in such a way that the latter will completely fill the stack in passing out, and the stack must be wide

enough to permit the gases drawn through the tubes to pass out without obstruction. Unless the stack is comparatively narrow, the exhaust steam will not fill it with a piston-like action; and the limit of narrowing the stack is reached before it becomes so restricted that the gases of combustion prefer the fire-box door or ash-pan to the stack as a means of exit to the atmosphere. On roads where special care has been devoted to finding out the best proportions of draft appliances, stacks half the area of the flue openings have given good satisfaction. Where the nozzle and base of stack are adjusted to act like the tubes of an injector, a stack opening ¼ the area of the flue openings is nearly correct. Engines on the New York Central, Old Colony, Chicago & Alton, Cincinnati, New Orleans & Texas, and other roads that are using a single nozzle, have given satisfaction with the first-mentioned proportion; the Chicago & Northwestern, Milwaukee, Lake Shore & Western, Wabash, Baltimore & Ohio, and other roads using a conical base stack, approximate the opening to ¼ the flue section. Mr. Hickey, master mechanic of the Milwaukee, Lake Shore & Western, by a careful series of experiments, discovered the best proportions for himself, without knowing that others had by similar means reached the same conclusion.

CONNECTION OF SMOKE-BOX VACUUM WITH STEAMING.

As the vacuum created in the smoke-box by the exhaust steam passing through the stack creates the draft that enables the locomotive boiler to generate steam with its well-known rapidity, it might be supposed that the arrangement of exhaust which produced the highest vacuum would produce the best results in steam making. Singularly enough, this is not always the case. In the course of very extensive and accurately recorded experiments made some years ago to demonstrate the relative value of different arrangements of draft appliances, it was found invariably that a lower smoke-box vacuum would keep up steam with a well-arranged single nozzle than could be used successfully with double nozzles. The tendency of double nozzles was to make an uneven vacuum in the smoke-box. That is, at a point near the passage line of the exhaust steam there would be a higher vacuum than in other portions of the smoke-box. This would result naturally from the exhaust steam having to create vacuum by its friction on the surrounding gases, instead of by a piston-like action in the stack. The single nozzle, on the contrary, tended to maintain an even vacuum throughout the smoke-box, and the gases passed through the tubes more uniformly than those drawn by the double nozzle exhaust. The practical effect of this was that steam was maintained with a lower vacuum and fewer cinders were drawn away from the fire.

THE EXTENSION SMOKE-BOX.

Where the extension front is employed as a spark arrester, the first requirement toward successful use is, that all joints be perfectly air tight. This is important in the construction of any smoke-box if economy is considered of any consequence. With the small displacement of air needed to produce a vacuum in a small smoke-box, steam may be made freely, at the time the exhaust is sucking air through every joint, but it cannot be done with the large smoke-box.

THE DIAPHRAGM.

The diaphragm used in the extension smoke-box is applied for the purpose of regulating the flow of the gases through the different rows of tubes. Without some device of this kind, the upper rows of flues would be overworked, while the lower flues would choke up for want of sufficient draft to clear them. It should not, however, be forgotten that the diaphragm is a necessary evil, the same as the cone in the diamond stack, and that under the best possible arrangement it is still an obstruction to draft. Where it can be made to perform its functions of clearing the lower rows of flues with the least possible obstruction to draft, there the engine will steam most freely, other things being equal. Not a little of the trouble experienced to make engines with extension fronts steam freely has arisen through stupid design and arrangement of the diaphragm. We know a case that illustrates this point. There was an engine that was noted as a poor steamer on a first-class road, celebrated for its advanced style of machinery. A shrewd engineer took this engine out one day because his regular engine was held in for repairs. The engine steamed badly from the start, and the train was got over the road by torture. This engineer, however, knew his business, and as the engine was of the same class as the one he ran daily, he saw no reason why she should not steam equally as well. At the end of the division he opened the smoke-box door for inspection. The diaphragm was found so far down that the draft was badly obstructed. He had it raised to what he considered the proper position, and on the return journey the engine steamed admirably, and threw no fire. On returning to his starting point this engineer went to the master mechanic in charge and explained the experience he had gone through with the engine. Was he commended for his intelligence and zeal? By no means. The master mechanic said he had no right to touch that diaphragm. It was set in the standard position for clearing the lower flues, and the engine *had* to make steam with it that way. The mechanical department was run with men who were towers of strength on the theory of their business, but were weak as water on the practical part. A very trifling change of position of the diaphragm appears to exert as much influence for good or evil on the steaming of an engine as a slight change in the position of the petticoat pipe does, and unless it is set just right, the engine will not give satisfaction. If some of the men who condemn the extension front combination as worthless would devote more attention to finding out the proper adjustment of the parts, they might have reason to change their minds.

THE SINGLE NOZZLE.

The exhaust nozzle arrangement exerts very great influence on the success of the extension smoke-box. While there were the best reasons for using double nozzles when they were placed low in the smoke-box, the change that places the exhaust opening up toward the top of the box brings with it urgent reasons for employing a single nozzle. Some railroads are using the single nozzle very successfully, but many who have tried it have failed to make it work properly. The greatest trouble has been that the single nozzle has caused so much back-pressure that the engine would not run freely. This is entirely due to a badly designed exhaust pipe. Many engines have the exhaust passages through the saddle altogether too small. If this restricted passage is protracted to the nozzle point, the chances are that there will more or less back pressure, even if the two passages join by easy inclination. Increasing the cross-section of an exhaust pipe to give the steam that passes out of a restricted passage in the saddle the opportunity to expand a little, will always have a relieving effect. The engines on the elevated railroads of New York have a globular vessel between the exhaust opening in the saddle and the nozzle, and it has proved an excellent arrangement. Mr. Charles Blackwell, when superintendent of motive power of the Norfolk & Western Railroad, made a series of very carefully conducted tests to prove the relative value of single and double high exhaust nozzles. The result was decidedly in favor of the single nozzle. In the early part of the experiments, a form of exhaust pipe was used for the single nozzle that induced very high back pressure in the cylinders. A new form was designed where the separate exhaust passages were carried up till they gradually closed to openings nearly equal to the opening of the nozzle. There was distance enough between the nozzle opening and the junction of the two passages for the steam to get guided centrally, so that it passed fairly up the axis of the stack. With this arrangement a single nozzle 4¼ in. diameter made the engine steam much better than she did with double nozzles 3¼ in. diameter. A similar arrangement was found by John E. Martin to give the best results in making steam economically and preventing the throwing of sparks. He tested the matter very thoroughly several years ago on a railroad in Peru.

We have recently seen the results of an experiment made by the Chicago, Milwaukee & St. Paul Railroad with a single nozzle. They bring the two exhaust passages up flush as for double nozzles, then put a cap on them about six inches deep with a single opening. The steam from each opening strikes successively on the side of the cap and is projected obliquely, so that the puffs of steam emerge from the stack crossing each other. There can be no advantage in using a single nozzle so badly designed.

BEST COMBINATIONS FOR STEAMING.

If a single nozzle is to be employed successfully, the exhaust pipe must be so designed that the steam will pass into the stack centrally, and the steam from one cylinder must be prevented from shooting over into the other passage. There is a point of exit for the steam a certain distance below the stack where the widest opening will give the maximum vacuum. The men who devote the most intelligent minds to investigating the why and wherefore of certain combinations working well or badly will be most likely to find the combination of the various draft appliances that will keep up steam with the least consumption of fuel. But the problems will not be solved without thought and labor.

Freight Brake Tests.

Mr. G. W. Rhodes, on behalf of the Committee of the Master Car-Builders' Association on Freight Car Brakes, has prepared a pamphlet giving particulars of how the tests at Burlington next month will be conducted. We quote the following:

1. The Master Car-Builders' Committee will have complete charge of all arrangements.

2. Three representatives of the brake being tested will be allowed to accompany the train. One representative of each brake company partaking in the contest will also be allowed on the train.

3. Five persons will be on the engine, as follows:

The brake company's engineer. It will be his duty to handle the engine during the trials, making the stops and starts as will be directed by the Committee's representative. If at any time in making a stop he finds that he has not control of the train he must immediately call for hand-brakes.

A. C., B. & Q. pilot. It will be the duty of the pilot to instruct the brake company's engineer as to grades, speeds to be maintained, etc. He will also attend to the oiling of the engine, the water and coal supply, and overlook the fireman's work.

The fireman. He will see that the maximum steam pressure is maintained as nearly as can be. This is especially important between stops in order that the speeds required by the tests may be reached. A good quality of cracked lump coal will be furnished for the trials.

A Committee's representative, whose duty shall be to signal the moment the stops are to be made, taking care that the engineer does not commence shutting off prior to this signal. He will see that no sand or reverse lever is used in making trial stops, and will notice the speeds and pressure carried on both steam and atmospheric gauges.

An assistant to the Committee's representative will attend to the telephone, answering all signals and communications. He will signal to the dynamometer car and rear car the moment each stop is ordered, and also to the rear car on the first move by the engineer to start up after a stop. Should this first move not be successful and the train come to a stop, the signal will be repeated till the train gets away.

4. The division superintendent or his representative will accompany each train.

The train crew will consist of two conductors and six brakemen.

The conductors will be classed first and second conductors.

The first conductor will have full charge of the train, such as getting orders, starting and stopping trains. His station will be on such parts of the train as his duties require.

The second conductor will be an assistant to the first conductor, and will obey his orders. He will see that the number of cars prescribed for each test are on the train and that the brakemen are equally distributed over the train. He will pull the pin of the pushing engine on receiving telephone orders. His station will be at the rear of the train.

The brakemen will obey all orders given by the conductors. They will see that only those persons ride on the train who wear train badges. They must remain at their posts during the trials, on no account aid in applying or releasing any brake unless on signal from engineer. Should any hand-brake be applied during the general tests, the stop will be thrown out.

5. A dynamometer car will be attached to the engine. The brakes will not be applied to it during any of the tests. The following persons will be in the car:

A Committee's representative, who will have charge of the car and its recording mechanism.

An assistant to the Committee's representative. He will attend to such duties in the car as will be assigned to him.

Two assistants to the Committee. It will be their duties after each stop to record the distance from the stop post to the engine cab window, taking their figures from the track stakes which will be placed at fifty foot intervals and properly marked. In addition to the above, four authorized persons will be allowed in this car.

6. An autographic recording apparatus for speeds, distances and brake-lever pressures will be placed in the middle brake car of each train. This car will be empty during all the tests, and its braking power transmitted to but one truck. The car will be in charge of a Committee's representative who will have charge of the apparatus and records.

An assistant to the Committee's representative, who will attend to such duties as will be assigned to him. Four other authorized persons will be admitted to this car.

7. The rear car of the train will be fitted with apparatus for indicating the moment the brakes begin to apply on the car, and when they let off.

It will also be fitted with telephone communication with the engine. The time records will be taken with stop-watches. A committee's representative and an assistant will have charge of the car. The former will record the time the stop is ordered on the engine, the time of the application of the brakes to the rear car and the time the car comes to a stop. He shall also record the time the engineer commences to release the brakes and the time the brakes are off the last car. The assistant will receive and forward all signals and telephone communications. The wires will be under the charge of a practical line repairer and electrician, who will accompany each train.

8. A. C., B. & Q. way-car will be attached to the rear car. Its brakes will not be used during any of the trials. In this car will be the conductor, such of the train crew as he may instruct, and the Committee's representative, assistant and lineman. Four authorized persons will in addition be allowed in this car.

9. (Gives summary of persons permitted in the train.)

10. The track and ground arrangements will be under charge of the resident engineer. He will see that stop posts are located as follows:

No. 1 stop. Two posts located one on each side of track. Level grade.
No. 2 stop, ditto.
No. 3 " " on 50 feet grade.
No. 4 " " " "
No. 5 distant stop, 1 post located 1,000 feet from Mt. Pleasant road. During the trial any train passing the distance post at a speed of 15 miles per hour or over, will immediately be stopped by hand-brakes on signal from engineer. On double track the North post will be 2 feet high and placed between the North and South tracks.

After each stop post the resident engineer will have properly numbered stakes driven at 50 feet distances for 2,000 feet from the 1st, 2d and 3d stop post, and for 2,500 feet from the 4th stop post.

At the No. 4 stop he will arrange a bulletin-board of such dimensions that the starts and stops made each day may remain bulletined during the day. A stand for an operator will also be provided, and seats for spectators, a portion of which will be roped off for the Committee's guests. He will also see to police arrangements.

10½. The operator will receive his orders from the M. C. B. Committee, and will send and receive dispatches. He will bulletin the movements of the test train, and also the record of stops after each trip, which will be furnished him by the committee.

11. Two car inspectors will be stationed at the end of the No. 4 stop to overlook and inspect the train after each trial or series of trials. They will be provided with oil, waste, brasses, a few extra bolts, rods, levers, etc., and other parts liable to get out of order during the tests.

The loading of cars will be under a Committee representative. His force will be of such capacity that 25 cars can be taken from the main track at West Burlington loaded with 40,000 pounds of old wheels and delivered back within five hours.

The light weighing of the cars and engines will be under charge of the C., B. & Q. scale inspector. He will see that all the equipment, prior to the trial, is properly light weighted and recorded. Also, that the first fifty loaded cars are weighed, and that the loads as transferred into different cars during the trial are properly recorded.

12. The preparing of badges will be under the direction of Mr. W. T. Hildrup. Four colors with proper designations will be used.

1. White. For train crew, including the local officers, committees, representatives and assistants. Will be good on all parts of train.

2. Blue. For admittance to the three cars—two dynamometer, and way car.

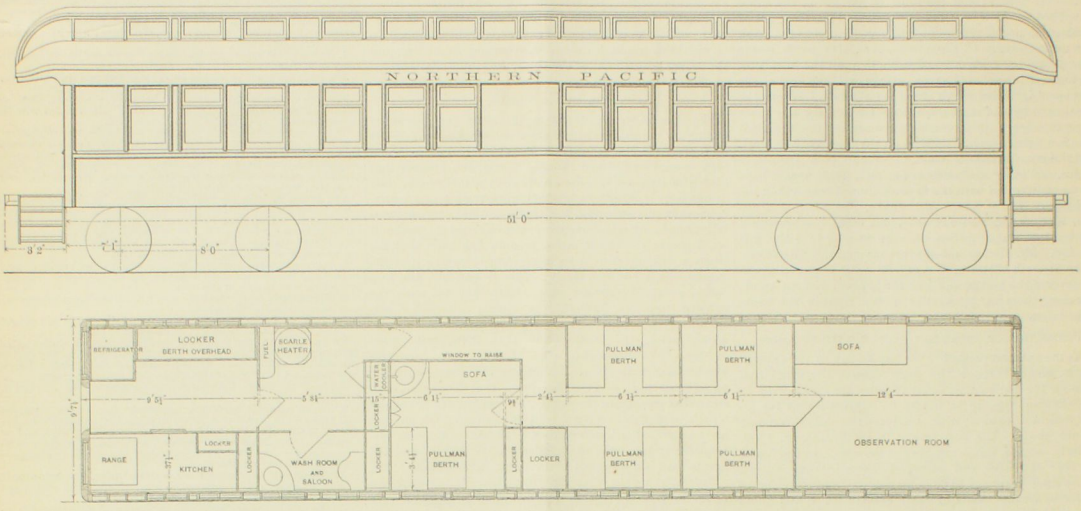
3. Purple. For the Committee's guests and members of the M. C. B. Association. This color will entitle the holder to any convenience that may be provided for visitors at stop No. 4. It will not allow the holder to ride on the test train.

4. Red. M. C. B.'s freight brake committee and brake competitors. Good on all parts of train.

The white badges will be issued by Mr. G. W. Rhodes, chairman of the brake committee. The others will be issued by Mr. W. T. Hildrup. Persons having white or red badges, whose duties do not require it, are requested not to ride on the top of the train.

McKEEN's improved automatic car coupler is being fitted to fifty new Tiffany refrigerator cars at the Lehigh Valley shops, at Packerton, Pa. This coupler has also been thoroughly tried on some six-ton coal cars with a short draw-head, being placed in the center of a train of 100 cars. It is said to work satisfactorily, and costs about $5 per car less than the hook and three-link coupler now used. It can, of course, be used also on ore cars or any other short cars.

NORTHERN PACIFIC RAILROAD BUSINESS CAR.



The car illustrated by elevation and plan in the engravings is the standard of its kind in use on the Northern Pacific Railroad. This road is so long that a car providing conveniences for living and doing business during a protracted trip is an absolute necessity. The officers of the road have frequently to go out on long tours of inspection, and the business car becomes their home for the time being. This car is 51 feet long outside of sills, and the room thus provided is admirably utilized for convenience and comfort. The observation room at one end is 12 feet 4 inches long and becomes the sitting and dining room of those occupying the car. The other internal arrangements are so plain in the engravings that no detailed description is necessary. The fittings are plain but tasteful. These cars were built in the company's shops at Brainerd, from drawings designed by Mr. Geo. W. Cushing, superintendent of motive power and machinery.

The Most Economical Point of Cut-off.

One of the most accomplished investigators into steam engineering as applied to locomotives in the United States, is Mr. David L. Barnes, of the Rhode Island Locomotive Works. The writer having differed from a conclusion reached by Mr. Barnes as to the most economical point of cut-off in locomotive cylinders, a correspondence eusued, from which we quote the following reasons given by Mr. Barnes for the faith that was in him:

The conclusion was not reached directly from experiments made for that purpose, but from a miscellaneous lot of data which I have been gathering for a long time. When I began to look up this most vital point in the economy of the locomotive, I found an almost perfect void of reliable information. During the last three years I have collected much that bears directly upon the subject, and they almost universally point to the great loss of early cut-offs, and to the laws of the loss due to cylinder condensation. Several extensive experiments made for the purpose of determining the loss due to early cut-offs at different speeds, etc., show the maximum economy of a stationary engine of the same size as the ordinary locomotive, to be realized at about 33 per cent. cut-off; and although the higher steam pressure and greater piston speed of a locomotive conduce to greater economy, the presence of the large quantities of water in the steam due to priming and the exposed condition of the cylinders and piston rod, inferior lagging and a few other considerations, overbalance these and raise the point of maximum economy in the average locomotive cylinder to about 38 per cent. of stroke, while the smaller and slower moving pistons are raised undoubtedly more than this, in some extreme cases, without doubt, to 60 per cent.

"I have recently found from experiments that I had long since concluded, that there was a point of cut-off where the common link motion was equal in economy to a Corliss valve gear, but this point is below the one of maximum economy. This point of equal efficiency is nearer the point of maximum economy in the locomotive than in the best stationary engines. That is, if some one did succeed in putting a Corliss gear or its equivalent on a locomotive, the point where the economy of the locomotive and the Corliss valve gear would be the same would be nearer the maximum economy than in the stationary engine. This is partially owing to the design of the locomotive boiler, causing excessively wet steam, which is wire-drawn into dryer steam in passing through the valve governed by a common link motion."

Two of the master mechanics belonging to the Northern Pacific Railroad are mayors of the cities where they reside. Mr. H. J. Small is mayor of Brainerd, and Mr. S. L. Bean is mayor of Glendine.

The New York State Car Coupler Trial.

In accordance with the announcement in our last issue, a trial test of car-couplers, under the direction of the Railroad Commissioner of the State New York, was made at East Albany, June 16 and 17.

The trials on both days took place under similar conditions with one important exception. On the first day each coupler was set to couple with a standard link in a common drawbar some 2½ inches below the standard height. As the drawbar selected had an open throat, the link could be driven back when struck, and practically none of the couplers could effect a coupling with a link of standard length. Three, the Aikman, Ames and Thurber, effected a coupling with links slightly over the standard length. The proceedings on the first day thus showed that under certain conditions cars must be coupled by hand. On the second day, however, a totally different common drawhead was used. The variation in height was less and the link could not be driven back. The result was that with the exception of the Perry, every coupler using a link coupled automatically with the link in the common drawhead. It seems a great pity that the trial was not conducted with the same common drawhead on the two days. The use of the two different drawbars renders any fair comparison impossible.

The tests made were as follows:

1. Coupling with its own kind at slow speed.
2. Coupling with its own kind at quick speed.
3. Set not to couple with its own kind.
4. Uncoupling from its own kind with ease.

The Commissioners also appeared to attach importance to the following points, on which they questioned the representatives of the different couplers:

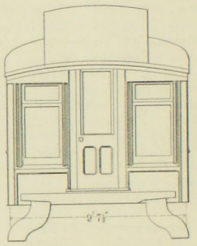
5. Can double dead-blocks on a dead wood be used?
6. If the knuckle, dog or analagous device breaks, how can it be removed and replaced? Can an ordinary pin be used in such cases?
7. Do the handles endanger persons going between the cars or working the couplings?
8. What is the cost of the couplers complete per car, including royalty?
9. Of what material is the coupler constructed?
10. Is it in regular practical use on any railroad?
11. Has it been indorsed by the Master Car-Builders' Association or by any State authorities?

The following is a list of the couplers tested, showing how they behaved in each of the four tests. Those with a * affixed were tried on the first day.

	Test 1.	Test 2.	Test 3.	Test 4.
*Adams, Felthousen & Lawtenslager.	Yes	Yes	Yes	Yes
*Aikman	Yes	Yes	Yes	Yes
*Ames	Yes	Yes	Yes	Yes
Archer	Yes	No	Yes	Yes
*Baldwin	Yes	Yes	Yes	Yes
*Barnes	Yes	Yes	Yes	Yes
Barr	Yes	Yes	Yes	Yes
*Boston	Yes	Yes	Yes	Yes
*Cowell	Yes	Yes	Yes	Yes
*Curtis & Wood	Yes	{ No / Yes }	Yes	....
Dowling	Yes	Yes	Yes	Yes
Fennell	Yes	Yes	Yes	Yes
Hien	Yes	Yes	Yes	Yes
Hoag	Yes	Yes	Yes	Yes
*Janney	Yes	Yes	Yes	Yes
Keeler	Yes	Yes	Yes	Yes
Kilmer	Yes	Yes	Yes	Yes
Kiltonbeck	Yes	Yes	Yes	Yes
*Lorraine	Yes	Yes	Yes	Yes
*Marks	Yes	Yes	Yes	Yes
*McKeen	Yes	Yes	Yes	Yes
Perry	Yes	....	Yes	Yes
Powell	Yes	....	Yes	Yes
Robinson	Yes	Yes	Yes	Yes
*Sherman	Yes	Yes	No	Yes
*Smillie	Yes	No	Yes	Yes
*Thurber	Yes	Yes	No	Yes
*Thurmond	Yes	Yes	Yes	Yes
Titus & Bossinger	Yes	Yes	Yes	Yes
*United States	Yes	Yes	Yes	Yes
Whitman	Yes	Yes	Yes	Yes
*Wilson	Yes	No	....	....
*Woods & Drake	Yes	Broke	....	....

The Ames, Aikman and Thurber were successful in coupling with links slightly longer than the standard.

Several of these couplers are little known, and have not been exhibited in their present form at any previous public trial, though the Fenner, the Powell and possibly one or two others have been in use for several months. The new couplers are the Barr, Fenner, Hoag, Keeler, Kilmer, Kiltonbeck, Powell and Robinson. The Whitman coupler is little known, but was tried at Buffalo by the Executive Committee of the Master Car-Builders' Association, in September, 1885.



The Barnes coupler shown at Albany was totally different from that shown at Buffalo, and changes had been made in the McKeen and other couplers.

Of the 42 couplers tried at Buffalo, only the following 16 were represented at Albany:

+Ames.	+Marks.
+Archer.	+McKeen.
Boston.	Perry.
Cowell.	Smillie.
Curtis & Wood.	+Thurmond.
+Dowling.	Titus & Bossinger.
Hien.	United States.
+Janney.	Whitman

Those which the Executive Committee of the Master Car-Builder's Association reported at Niagara Falls June 8 were most worthy of further trial are indicated by a +.

It is somewhat remarkable that the Blocker coupler, very lately approved of by the Railroad Commissioner of the State of Michigan, was not represented at either Albany or Niagara Falls, as far as could be ascertained by diligent search and inquiry. The Hilliard, a coupler having a hook rotating in a vertical plane, was also absent, though it has received the approval of the Railroad Commissioners of Massachusetts.

NOTES OF COUPLERS.

AIKMAN. Claim a superiority over other forms of rising and falling hook (Archer type), as the strain does not come on pin, but on a crotch or offset in the hook-bar bearing against a corresponding offset in the drawbar casting. This coupling has been running through the winter on the Grand Trunk. It performed especially well in coupling with a link in a common drawhead some 2½ in. below the standard height.

AMES. When set not to couple, the hooks in both heads were moved both by hand and lever. It was claimed that they could be moved by lever only in the latest improved style of this coupler. The couplers exhibited appeared, however, to be fresh from the paint shop. When set not to couple, the cars did not couple, but one hook was jerked forward, and would have possibly coupled on the rebound. Can be uncoupled with one lever, if the right lever is selected, which is somewhat difficult at night.

ARCHER. This coupler, like the Marks, has a loose link, held by a sort of long hook rotating in a vertical plane.

BALDWIN. This coupler is in use on the Cincinnati, Wabash & Michigan. It consists of a hook rising and falling in a vertical plane, and operated by a flat spring. A very similar device was patented by Mr. Cowell (the inventor of the Cowell coupler) in 1874.

BARR. This coupler is of the loose link type, a dog swinging from above supporting the pin. This coupler has been very recently introduced.

COWELL. Can be uncoupled with one lever; used by the Fitchburg, Lehigh Valley, Newburg, Dutchess & Connecticut, Boston & Providence, Providence & Worcester, New York, Providence & Boston, Detroit, Lansing & Northern, and Pennsylvania Company.

CURTIS & WOOD. A link 13¼ in. long can be carried inside the drawbar, but is not fixed. The hook is cast steel, and it is claimed can be replaced in 15 minutes if broken. The cost of the coupler complete is given at $17. It is in use on the Philadelphia & Reading, Union Pacific, and 20 cars on the Delaware, Lackawanna & Western.

DOWLING. Trials were made to couple with the Janney, and were fairly successful. The knuckle was removed to show how quickly this can be done, and an ordinary pin somewhat bent by

use was substituted for the proper locking device. Notwithstanding this, the coupler operated perfectly. The arrangement as regards central buffer in line of sills was similar to Janney, no dead-blocks being used, but inventor explained that they can be used if necessary. Pin can be drawn or knuckle opened with one hand. Used on the Pittsburgh, Cincinnati & St. Louis.

FENNELL. This coupler has a species of massive link rotating in a vertical plane above the drawhead, and engaging with a suitable lug or crotch on the upper surface of the drawhead. Each link weighs 75 lbs., and in the latest arrangement the lower link effects the coupling and the upper rides on it, and the combined weight, 150 lbs., prevents the links rising sufficiently to permit the cars to come uncoupled during a journey. This coupler has been in use on the Skaneateles Railroad for some time, and as that line has very sharp curves and heavy gradients, it has been subjected to severe tests. The inventor, Mr. Fennell, is the master mechanic of that line.

HIEN. This vertical plane coupler has been before the public for several years. Mr. Updike informed the Commissioners "that 170 of these couplers had been in use on the New Haven & Northampton for two years. Five or six hooks and hingepins have broken during that time, but the locking gear has given no trouble, and 41 couplers of the latest pattern have done well." Both heads have to be opened to couple or uncouple. The inventor considers this necessary in order that when run together set not to couple, the heads may strike fair and square without any tendency to pass one another. This coupler will not couple automatically with any other. One pull at the handle and letting go uncouples, but it is impossible to tell from inspection whether two cars are coupled or uncoupled. It is set not to couple by going between the cars. A car fitted with this drawhead was set not to couple and then driven sharply against a Safford drawhead, in order to ascertain if they would interlock, but nothing of the kind occurred, the result being satisfactory.

HOAG. This coupler was tried before the Massachusetts Commissioners in 1884. It is of the loose link and pin type. The pin is supported by a long steel casting of somewhat peculiar shape.

JANNEY. The cars exhibited fitted with this coupler had a special arrangement of levers, which differed from that adopted by the makers in all other cars fitted. It was claimed that this arrangement was faulty, and owing partly to this and partly to some misunderstanding of orders, the coupling did not work perfectly. Trials were made to ascertain if the Janney would couple automatically with the Dowling, and this appears to be possible if the Dowling head be kept shut and the Janney knuckle left open, but not otherwise. The couplers and cars exhibited had been in use for some time, while all the other couplers appeared quite new.

KILMER. This new coupler is of the loose link type, with a dog of peculiar shape, somewhat resembling that used in the Gifford.

KILTONBECK. This coupler is of very recent invention, and differs in a very important respect from any coupler exhibited.

LORRAINE. This vertical plane coupler has a knuckle hinging on the right-hand side of the head looking toward the coupler, and it will not therefore couple with the Janney and other left-handed vertical plane couplers. The inventor states, however, that he will alter this, and can make his device couple with the Janney. This coupler has been adopted on the 700 refrigerator cars of the St. Louis Refrigerator Car Company (Anheuser Busch Brewery).

MARKS. The inventor claims that it is more easily operated than the Archer, which is somewhat similar. The gear for working is underneath, so that the sills and dead-blocks are not cut away, and the drawhead is supported by links close to the face, where support is most needed. The height of the link can be controlled. An attachment for carrying a spare link is provided. Used on the Cleveland, Lorain & Wheeling, Flint & Pere Marquette, and Cleveland, Columbus, Cincinnati & Indianapolis.

MCKEEN. This is of the class of loose link couplers, with pin supported by a gravity dog. The dog, the link controller, and the arrangement of levers for working are all very simple and well designed, and present a strong contrast to many of the crude contrivances exhibited. This coupler is used on the Lehigh Valley and Delaware, Lackawanna & Western.

PERRY. This loose link coupler is well known, and is in use on a great number of roads, including the Fitchburg, the Housatonic, the Chicago & Eastern Illinois, the Milwaukee & Northern, the St. Paul, Minneapolis & Manitoba, and others.

POWELL. This coupler attracted considerable attention, owing to the ingenious way in which it was designed and the excellence of the castings of which it was made. The inventor took it completely apart in a few seconds, in order to show the Commissioners that it had no machine work about it, and that the parts were held together without any bolts, nuts or springs. The coupler was very easily uncoupled either by hand or foot, without taking up the slack. A loose link is used, and the dog supporting the pin resembles a pinion with four teeth. The pin, like the rest of the coupler, was cast steel. A link controller to elevate or depress the link when coupling is used. The whole coupler, including the handles for working, is very ingeniously and carefully designed. It has been used for 11 months on 20 cars on the Kansas City, Fort Scott & Gulf.

ROBINSON. This coupler has a loose link, and a dog or curved pin, and a link-controller.

SHERMAN. Loose link type with spring-supported pin. The gearing appears somewhat complicated, and the link controller in its present form would be soon damaged. Recent invention, not yet in use on any railroad.

SMILLIE. This coupler, which was tried in Buffalo in September last, and has since been somewhat modified, the peculiar link connected loosely by its centre to the drawhead being abandoned, and a plain loose link substituted. This coupler is in use on the Delaware, Lackawanna & Western.

TITUS & BOSSINGER. This coupler was tried at Buffalo in September, 1885, and is a vertical plane coupler of the Miller type, with a hinge head. It will couple with the heads either open or closed. It will couple with the Miller. One advantage claimed is that the draft in on the center line. One of the cars fitted was driven sharply against a car fitted with a Safford drawbar. The Titus & Bossinger head passed the other on one side. This would, however, not have taken place if double dead-blocks had been used on both cars. The importance of double dead-blocks as a safety attachment could hardly have received a better demonstration. This coupler has been in use for some time on the Chesapeake & Ohio.

WHITMAN. This coupler uses a loose link and a dog supporting a special form of pin, a cross-bar being secured to the back of a common pin. This cross-bar keeps the back end of the link down, and so forms a link controller. If the pin is slightly lifted, the front end of the link is lowered. The pin is supported by a spring plunger, which also prevents the link being pushed too far back. The coupler has been used since September, 1885, on 3 or 4 cars on the Lehigh Valley.

WILSON. This is of the loose link class, with a gravity dog, and is used on the Ulster & Delaware on a few cars. Old or broken pin can be removed and new pin substituted by removin cap in upper part of drawhead.

THE Northern Pacific Railroad Company are putting air brakes on their freight car equipment at the rate of 1,000 cars a year. The line stock and express freight cars are having the brake put on first, but the intention is to keep on until the whole freight car equipment is supplied with the brake. The air pump and other apparatus have lately been put on 80 locomotives that are pulling freight trains. The regular practice on the road now is to put whatever cars have the air brake on to the front of the train, and there is generally enough to hold the train without the aid of brakemen.

When built	1883.	1883.	1883.	1883.	1883.	1883.	1883.	1881.	1871.	1882.	1881.	1882.	1881.	1881.	1873.	1880.	1872.	1872.
Class of engine	H.	I.	J.	K.	E.	F.	C.[2]	C.[1]		D.[1]	C.[1]	B.[2]	D.[2]	C.[2]	A.[1]	C.[2]	B.[2]	B.[1]
No. of Engine	125	299	401	145 to 149	455	463	164	100	12	83	169	150	75	65	35	13	9	3
Builder	4-wh'l sw'ch. Baldwin.	6-wh'l sw'ch. Baldwin.	8-wheel Lignite.	Standard. Mogul.	Standard. 10-wheel.	Standard. Consolidat'n.	Standard.	Baldwin.	Pittsb'gh.	Baldwin.	Taunton.	Hinkley.	"Wootten," Baldwin.	Manch.	Baldwin.	Baldwin.	Baldwin.	Baldwin.
Dimensions of cylinders	15″ × 24″	16″ × 24″	17″ × 24″	18″ × 24″	19″ × 24″	20″ × 24″	17″ × 24″	17″ × 24″	15″ × 22″	18″ × 24″	17″ × 24″	16″ × 24″	18″ × 24″	17″ × 24″	15″ × 24″	17″ × 24″	16″ × 24″	16″ × 22″
Diameter of flues	2″	2″	2″	2″	2¼″	2″	2″	2″	2″	2″	2″	2″	2″	2″	2″	2″	2″	2″
Length of flues	10′ 11¾″	11′ 0″	11′ 10″	12′ 0″	12′ 3″	12′ 6″	12′	11′ 10″	10′ 11″	10′ 10″	11′ 6″	11′ 0″	9′ 1″	11′ 10″	10′ 10″	11′ 10″	10′ 11″	11′ 6″
Number of flues	104	145	234	234	190	270	196	152	130	180	178	157	180	167	144	165	144	140
Sq. inches area of flue openings	250.1	348.7	562.7	562.8	596.9	649.4	471.4	365.5	312.6	432.9	428.1	377.6	432.9	401.6	346.3	396.8	346.3	336.7
Sq. feet of heating surface of flues (outside)	597.8	835.1	1,449.7	1,470.2	1,370.8	1,767.1	1,231.5	941.7	743.0	1,021.0	1,071.7	904.2	856.0	1,034.7	816.8	1,022.3	823.0	842.9
Sq. feet heating surface of fire-box	66.0	108.0	142.4	123.4	118.0	137	125.1	120.8	85.9	137.3	113.5	104.9	145.0	116.5	92.5	103.2	104.6	100.7
Total sq. feet of heating surface	633.8	943.1	1,592.1	1,593.6	1,488.8	1,904.1	1,356.6	1,062.5	828.9	1,158.3	1,185.2	1,009.1	1,001.0	1,151.2	909.3	1,125.5	927.6	943.6
Sq. feet of grate surface	11.2	17.1	17.8	15.4	17.1	34.4	15.8	32.3	13.5	18.4	17.7	16.2	14.9	16.8	14.1	14.6	15.2	14.2
Sq. feet of heating surface to 1 sq. foot of grate surface	59.2	55.1	89.4	103.4	87.5	55.3	85.8	32.8	61.4	62.9	66.9	62.2	67.1	68.5	64.4	77.0	61.0	66.4
Cubic inches in cylinders	8,482	9,650	10,895	12,214	13,609	15,079	10,895	10,895	7,775	12,214	10,895	9,650	12,214	10,895	8,482	10,895	9,650	8,846
Cubic inches in cylinders to 1 sq. foot of heating surface of boiler	12.7	10.2	6.8	7.6	9.1	7.9	8.0	10.2	9.3	10.5	9.1	9.5	12.2	9.4	9.3	9.6	10.4	9.3
Sq. inches area of cylinders	353.43	402.12	453.96	508.93	567.05	628.32	453.96	453.96	353.43	508.93	453.96	402.12	508.93	453.96	353.43	453.96	402.12	402.12
Sq. inches area of cylinders to sq. inches area of flue opening	1.41	1.15	0.80	0.90	0.95	0.96	0.96	1.24	1.13	1.17	1.06	1.06	1.17	1.13	1.02	1.14	1.16	1.19
Sq. feet heating surface to 1 sq. inch area of cylinder	1.87	2.34	3.5	3.13	2.62	3.03	2.96	2.31	2.34	2.27	2.61	2.48	1.96	2.53	2.57	2.47	2.30	2.34
Length of fire-box	46 13/16″	71 11/16″	78″	67½″	71¾″	116¾″	69″	108″	54″	78″	72″	65½″	60¼″	67″	58″	65½″	64½″	60″
Width " " at top	37″	42″	49″	51½″	46″	54″	46″	42½″	38″	45½″	40½″	39″	45″	44″	42″	42″	43″	43½″
Width " " at bottom	34⅝″	34⅝″	33″	33″	34⅝″	42″	33″	43½″	36″	34″	35½″	35½″	34¼″	36″	35″	34″	34″	34″
Height " " at front	50″	60″	74″	69½″	65″	53″	72″	48″	60″	73″	64½″	64″	73″	68″	60″	62″	62½″	63¼″
Height " " at back	50″	60″	73½″	69″	65″	50½″	70½″	39″	60″	73″	64½″	64″	73″	68″	60″	62″	62½″	63¼″
Length of combustion chamber								5½″					19¼″					
Diameter of boiler shell	42″	48″	54″	56″	54″	60″	52″	47¼″	42″	51″	49¾″	48″	51″	48¾″	48″	48″	47½″	48″
Diameter of driving-wheel	49″	49″	62″	54″	54″	49″	62″	62″	56″	54″	54″	62″	54″	62″	58″	62″	62″	62″

NOTE.—Boiler for Class A.[1] Same for class A.[2]

Dimensions of Northern Pacific Locomotives.

The annexed table gives the leading dimensions of all the locomotives belonging to the Northern Pacific Railroad Company. Mr. G. W. Cushing, the Superintendent of Motive Power, has devoted accurate investigations to finding out what proportions produce the most economical engine. The results of his researches have indicated that a close relation exists between the area of the cylinders and the cross-section of the flue openings. Increase or decrease of the grate area or of the fire-box heating surface in proportion to the cylinder capacity, does not affect the economical operating of a locomotive so readily as changing the total flue openings. Early locomotive designers insisted that a close relation existed between the cylinder capacity and the flue openings, but their views on the subject came to be ignored to a great extent, especially by the advocates of large grates and spacious fire-box surface.

Mr. Cushing found that the locomotives having 0.96 square inches of cylinders to the square inch of flue opening, were about correct for burning ordinary coal. Where lignite or other inferior coal is used, 0.80 square inches of cylinder to the square inch of flue opening is a good proportion. Engines of the first-mentioned proportions have cylinders 17 × 24 inches, which is equivalent to 454 square inches of cylinder area. The cross-section of flues at fire-box is 471 square inches. When a locomotive is so proportioned that there is more than one square inch of cylinder area to the inch of flue opening, steam is generated only by hard firing, or by the species of forcing that deals with unduly contracted nozzles. We believe many master mechanics having engines noted as heavy coal burners might receive new light by studying the proportions under the inspiration of Mr. Cushing's discoveries.

Communication.

The Niagara Convention.

Editors Car and Locomotive Builder :

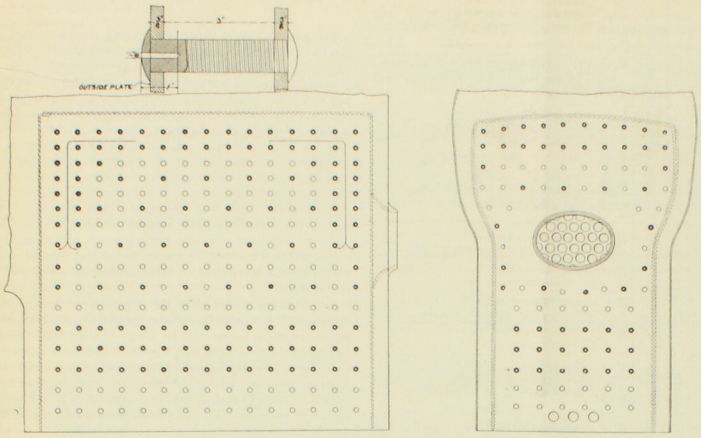
Having attended the recent convention of the Master Car-Builders at Niagara Falls, I came away greatly impressed with the stupendous spectacle of the great cataract, as well as by those wonderful structures of engineering skill, the suspension and cantilever bridges which span the chasm below the falls with such beautiful and graceful symmetry. So much was my mind absorbed in the contemplation of these wonders of nature and art, that for the time being I came near forgetting the real object of my journey to this interesting point on our Northern frontier, which was to attend the annual meeting of the Car-Builders' Association, listen to the discussions, and if possible learn something from the experience of those who have long been engaged in the car department service of the roads.

A careful observation of what was said and done during the three days' session confirmed my previous impression of the usefulness of the organization in whatever pertains to the better construction of cars I could not but notice, however, that there were some apparent drawbacks, or what seemed to me to be peculiarities in its discussions and routine work. A few of the members manifested a great deal of zeal and capacity for talk, while others were evidently bent upon carrying out their own particular views upon every subject that came up for discussion, giving little heed to any adverse opinions that might be advanced. Their arguments were framed with much shrewdness and plausibility, which gave them the advantage over others less gifted with the arts of persuasive oratory. This was exhibited in the attempts to overrule and change established standards that had been adopted by the association years ago, after thorough discussion and great effort and expense on the part of a large number of roads to render such standards permanent. These changes were urged, as it seemed to me, not because the standards were not good ones in themselves, but because they were not exactly in conformity with the local methods of doing things to which these gentlemen had been accustomed; and if I am correctly informed, these proposed changes in standards already adopted come from those members whose connection with the association bears a fresh date.

This, to one who came to listen and learn, did not seem to be quite the correct thing, and I was gratified to see that the movement did not succeed. And in this connection I may as well say that I learned incidentally that these same parties attempted to carry their point at the annual convention a year ago by a carefully matured plan to secure the officers of the organization, by ignoring in a great measure the old and tried members who had borne the burden of labor during all the years in which the association was struggling for recognition by the general officers of the roads with which they were connected. This little scheme of the comparatively new members was so completely frustrated last year, I am told, that no attempt of the kind was made this year to displace the old officers, who were again chosen without opposition, and as a matter of right and justice to the old membership.

Aside from the exceptional matters to which I have alluded, the proceedings were generally interesting and harmonious.

CAR-BUILDER.



METHOD OF DETECTING BROKEN STAY-BOLTS.

THE engravings illustrate the method employed by the mechanical department of the Chicago, Burlington & Quincy Railroad, for the detection of broken stay-bolts in their locomotive fire-boxes. The cuts represent two views of the class A fire-box. Respecting the method followed we received the following account: "We have been troubled more or less with imperfect stay-bolts, and we finally decided to do away with inspection and in lieu thereof drill the stay-bolts from the outside with ¼ inch hole 1 inch deep. We commenced drilling all the second bolts in alternate rows, but some of our master mechanics, realizing how much benefit they get from this method of drilling, have asked for and obtained permission to drill every bolt in the fire-box, even the crown stay-bolts of all fire-boxes secured by this method instead of crown-bars. When old engines pass through the shops, we are more particular about drilling these bolts than in the construction of new engines, and it is quite remarkable that, notwithstanding all the sounding our boilers may have given the old bolts while the engine was being overhauled, the drilling almost invariably leads to the detection of broken ones after the engine has been fired up, and which were overlooked by the sounding process. We have not considered it necessary to drill the bolts on the inside sheet, as more than nine tenths of those that break are found cracked next to the outside sheet.

The Lewis Locomotive Valve Motion.

Mr. W. J. Lewis, master mechanic of the St. Louis, Arkansas & Texas Railway, has designed a new form of valve gear for locomotives. The motion is taken entirely from the cross-head, the cross-head on one side driving the valve for the opposite cylinder. The motion appears to have been well worked out, and is said to give an even distribution of steam in the forward and back strokes. It has already been applied to one locomotive which is reported to be smarter than the usual run of engines equipped with the link motion. If the link motion has not got to go soon, it will not be for want of inventors trying to devise a superior substitute.

The problem that Mr. Lewis has worked out, of operating the valves of a locomotive by movements transmitted from the cross-head, has been tried before with indifferent success. Several of the early locomotives built in this country, before the V-hook era, had the valves operated from the cross-head, but the arrangement used for modifying the motion must have been very crude.

Railway Passenger Traffic in Great Britain.

The official statistics of railway operation in Great Britain for the half year ending December 31, 1885, show the following results of passenger traffic on a constructed mileage of 17,550 miles:

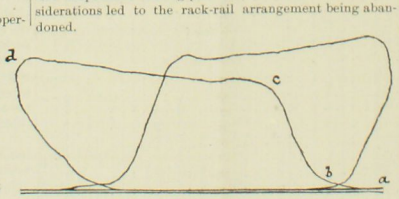
	Passengers carried.	Receipts.
First-class	13,477,556	£1,617,068
Second-class	23,951,142	1,452,713
Third-class	265,778,890	9,126,259
Total	303,207,588	£12,196,040

Of the whole number of passengers carried, 4.44 per cent. was first-class, 7.9 per cent. second-class, and 87.7 per cent. third-class, and of the total receipts 13.26 per cent. was first-class, 11.91 per cent. second-class, and 74.83 per cent. third-class. This is exclusive of the Metropolitan system of London and the season tickets of the London & Southwestern. As compared with the returns of passenger traffic of all the roads of the United Kingdom for 1884, exclusive of the Metropolitan, there is an increase of about two per cent. in the number of third-class passengers, and also in the receipts from third-class.

Leaving Car Doors Open.

An unusually emphatic order has been issued by the Erie Railroad management, instructing conductors of freight trains to see that all car doors are securely fastened and kept closed on the road. The origin of the order was a verdict for $25,000 against the company for damages done by a loose car door striking a sleeping car and inflicting injury on passengers. Every road cannot expect to obtain such a striking warning against open car doors as the Erie received, but all nevertheless have the most urgent reason for issuing orders in the strongest possible terms against the prevailing practice of running with the doors of empty cars open. An empty car with the doors open acts like a parachute on the engine pulling the train, and often enormously increases the train resistance, yet a train of empty cars nearly always contains a large proportion of open doors. If the expense added uselessly to train operating through car doors being heedlessly left open, were summed up for one year, it would on many lines be found to throw a damage suit for $25,000 into small proportions by comparison.

REPORTS have been circulated that the Northern Pacific Railroad Company intend operating their track across the Cascade Mountains with a rack-rail arrangement similar to that in use at Mount Washington. There is no truth in this. Until the tunnel is completed, which will reduce the grade to 116 feet to the mile, the mountain will be crossed on a grade whose maximum rise will be 300 feet to the mile. This grade will be operated on plain rails by "Decapod" locomotives that are now under construction at the Baldwin Locomotive Works. Strong efforts were made to induce the company to operate the heavy grades with a German rackrail system, and the matter received thoughtful consideration. The engineering department favored the plan a little, and there was talk of crossing the mountains on a grade rising ten per cent. To operate the business safely on such a grade entailed many changes on the rolling stock. There was also fears that the heavy snow-fall on the mountains might render the rack mechanism inoperative during part of the winter. These considerations led to the rack-rail arrangement being abandoned.



Reversed Motion Diagram.

THE annexed figure is a reproduction of an indicator diagram taken from a locomotive running a passenger train on the Chicago, Alton & St. Louis Railroad when the motion was reversed. As it may puzzle some of our readers to interpret the lines, we will venture an explanation. The piston begins to move from the center at *a* and meets with little resistance till the point *b* is reached, where the valve closes. The back resistance, due to the compression of the air within the cylinder, then increases rapidly till point *c* is reached. The cylinder-cock being open, enables part of the compressed air to escape, and the pressure does not rise to boiler tension. When the point *d* is reached the valve opens, and the pressure quickly falls to near the atmospheric line. The card taken from the other end of the cylinder does not differ materially from that described.

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EDITORIAL ANNOUNCEMENTS.

Advertisements.—*Nothing will be inserted in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. The editorial department will contain our own views and opinions; and the rest of the reading matter, aside from advertisements, will be such as we consider of interest to our readers.*

Contributions.—*Articles relating to railway rolling stock, construction and management, and kindred topics, by those who are practically acquainted with these subjects, are especially desired. Also early notices of changes in railroad officers, organizations and names of companies.*

Special Notice.—*As the* CAR AND LOCOMOTIVE BUILDER *is printed and ready for mailing on the last day of the month, advertisements, correspondence, etc., intended for insertion, must be received not later than the 25th day of each month.*

NOTES OF THE MASTER CAR-BUILDERS' CONVENTION.

In talking round among master car-builders for a few weeks before the convention, we received the impression that the meeting at Niagara Falls would be lightly attended, owing to the distraction to business in the North caused by the labor troubles, and owing to the belief that the work connected with the change of gauge would keep many Southern members at home. This impression was shared by many, and we were surprised on reaching Niagara Falls, on the evening of the 7th, to find so many members already there. It proved a remarkably well-attended convention, besides being noted for the attention the members gave to the meetings. A large assemblage may be inconvenient to some extent for the prompt transaction of business, but there is some encouragement for those carrying on the work to go ahead energetically when they find their efforts supported by the personal attention of their fellow-members.

The air or surroundings of Niagara Falls appears to have an excellent effect upon the car-builders who meet there, for each convention held at that place has been noted for the assiduous way business was attended to. But the manner in which the work was pushed through on the first day of the recent meeting was rather phenomenal. So much was done that the prediction was freely made that business would be finished on the second day. The meeting on the first day was held in an opera-house connected with the International Hotel, and the place was decidedly too large, for there was much difficulty in hearing the speakers. This accounted for the prompt way some of the reports were passed with little or no discussion. There was a disposition manifested to indulge in some debate over the proposed amendments to the constitution, but Mr. Wall removed most of the opposition to his amendment by the explanation of the purpose of the change, and his protest that no thought was entertained of curtailing the power of the president.

It was only after the report on standard dead-blocks was read that the convention wakened up thoroughly to business. This report was prepared by Mr. Forney, and was a monument of good intentions, but the proposal to change an established standard roused so much opposition that other beneficent changes were swept away. The discussion relating to changing the height of freight car draw-bars displayed very strong and vigorous opposition to the proposal, but the protests of debate were mild compared to the denunciations the scheme received in the lobby. We heard several members representing important roads say they would have been ashamed to return and report to their officers that a change in the height of draw-bars had been carried. Others did not hesitate to say they believed that the adoption of the report entire would have ruined the association. The principal support to the proposed change came from the Pennsylvania interests, and the representatives did their work with their usual ability and with unusually little friction. There were some pleasant passages of arms between Mr. Adams and Mr. Wall, but they were not of the kind that leave sores, and rather enlivened the course of business.

When the subject of a standard freight car truck came up for discussion, the surprising thing demonstrated was how little the ordinary run of members cared about a standard truck. The truck designed by the committee was sent to letter ballot, but this was done in such a half-

hearted way that it is doubtful if enough votes will be recorded to make it standard. If the railroad companies interested fail to make this truck standard, there is little hope of the association ever having a standard truck.

The reading by Mr. Wall of the report on end platforms stirred up a ripple of excitement, principally on account of the skillful way a forlorn hope had been fought. Mr. McIlwain appeared to make a point in the line of pleasantry when he intimated that Mr. Wall had omitted the new fact, learned during the year, that the Baltimore & Ohio had decided to abandon the end platform; but the answer given, that their reasons for making the change were not new, turned the tide of merriment on the other side.

The tread of wheels, as usual, brought out a lively discussion and great diversity of opinion as to the best form of tread. Those favoring a slightly coned wheel had decidedly the best of the debate. There were several surprises connected with the introduction of the subject of a standard brake shoe. In the first place, most of the members appeared to think they were done with the subject for the present, and the proposal to establish two standard brake shoes was a surprise. Dual standards are by no means popular, but many were inclined to vote that way as a compromise. It seemed accepted as a foregone conclusion that the proposal to make both the Christie and Collin shoes standard would go to letter ballot without serious opposition; yet, when Mr. Marden proposed to send the Christie shoe alone, the members came round to his side like a wave. The surprises culminated when Mr. Cloud withdrew his motion in favor of the Collin shoe.

The recommendations made by the Executive Committee that seven out of the twelve car couplers selected at Buffalo should be submitted to the tests of service, excited indignant comment that found but little expression in the meeting. There appears to be a delicacy of speaking on this subject in the meeting, members alleging that remarks are liable to be misconstrued, but many of them expressed very strong dissatisfaction privately. The action of the Executive Committee will probably be fully explained at the proper time, but some of the master car-builders thought it an extraordinary proceeding, to say the least of it, to favorably commend for further trial one coupler that never has been in actual service on trains and leave others without mention that had been giving satisfaction for months in hard service.

When the discussion of the Rules of Interchange of Cars came on the men who expected a short convention soon found that they had reckoned without their host. These proceedings developed a great deal of wearisome objecting and petty opposition of a trifling character. Discussing the rules of interchange is a convenient time for novices to get into the way of hearing themselves talking, and the opportunity was embraced freely at Niagara Falls.

NOTES OF THE MASTER MECHANICS' CONVENTION.

People in other sections of the country are fond of casting ridicule on the reputed pretensions at culture and transcendental refinement of Bostonians, they use disrespectful epithets in speaking about the alignment of Boston streets, and laugh at the old-fashioned habits and sleepy ways that cling to the place, yet they are very fond of visiting the Athens of America. At either of the many conventions we had hitherto attended, we had never heard so many and such unanimous expressions of satisfaction respecting the place of meeting as were daily heard at Boston. To be sure, visiting the city of Boston was merely incidental to the Master Mechanics' Association, but we are persuaded the attractions of the historical city added in no small degree to the success of the convention by bringing out an unusually large attendance of members. Seldom has a convention been represented by master mechanics from such a large geographical area. From Northern Canada to Southern Texas, from Maine to Oregon, members came and contributed their individual portions to the general enlightenment. In spite of the numerous outdoor attractions, the meetings of the convention from first to last were better attended than any we had previously observed. During the closing session over seventy members voted in a division, and a good many refrained from voting on the question.

The president's address, as might have been expected from the well-known scientific attainments of the speaker, was one of the ablest opening speeches ever made before the association. His advice against coming to foregone conclusions, and plea for exact experiments accurately conducted and carefully recorded, were very seasonable. Some of the most conservative members we heard talking about the address acknowledged that greater care than had habitually been given was necessary in coming to conclusions about the value of different material, new appliances and novel methods. As a presiding officer, Mr. Barnett labored under the disadvantage of not being perfectly familiar with parliamentary practice, but most of the members were easily controlled.

The harmony of the convention was threatened in the beginning by an attack on the secretary by a gentleman who was recommended through a practical joke, and was admitted as a member by mistake last year, although under the constitution he was not entitled to join the association. Harmony was restored and assured by the adoption of a resolution directing the secretary to drop the gentleman's name from the roll. The only cause for regret about this incident was the time wasted.

The reports read were decidedly above the average in interest, and in throwing new light on the subjects investigated. It is rather invidious to pick out papers for special mention, from a list that exhibits the results of new born industry; but the papers on Driving-Wheel Brakes, Balance Slide Valves, and Shop Tools and Machinery, are particularly good. The reports submitted from year to year on locomotive boilers have attenuated the subject to some extent, and a committee having the subject on hand can be readily excused for submitting a brief report. But that is no reason why long papers by outside parties should be annually imposed upon the report on locomotive boilers. At this convention Mr. J. S. Bell was permitted to occupy the time of the meeting for over an hour, in reading a paper that consisted of a labored plea in favor of a patented boiler, when it was not dealing with historical data of no special interest. That paper led many members to the conclusion that it was time closer scrutiny were exercised over papers submitted to the association by outside interests. A committee subsequently appointed to report on making changes in the constitution will, it is understood, recommend new rules regarding the introduction of papers.

The discussion of short questions proved, as usual, an interesting feature of the Boston meeting. Several other questions would have been submitted, and those under discussion would have elicited even more debate, had it not been that time was too limited. The interest manifested in these discussions, and the valuable information brought out by them, supply good reasons why verbal discussion should be cultivated and encouraged. About four hours were devoted to reading of reports that might as well have been submitted in printed slips.

The discussion on Exhaust Nozzles indicated that many of the members are taking thoughtful interest in the subject, and will doubtless result in experimenting with the view of obtaining accurate information as to the forms that produce greatest draught with the lowest steam velocity.

The seasonable question introduced by Mr. G. W. Stevens, "What good are self-dumping ash-pans?" proved that few master mechanics are disposed to agree that a device which makes air-tight ash-pans impossible contributes to the saving of coal. Very few master mechanics are in the habit of giving testimonials in favor of patented devices, and those who certified that a self-dumping ash-pan effected a material saving of coal deserved the rebuke they received by the convention passing a resolution deprecating the practice of giving testimonials.

The question raised by Mr. Wm. Woodcock, "Is it desirable to continue the use of steel for driving axles?" brought out one of the most interesting debates heard at the meeting. Mr. Woodcock had every reason to be satisfied with his experience with steel driving axles, but he had heard others complaining about the unreliable nature of steel, and he was willing to have their views made public. Mr. Lauder was the principal opponent of steel for axles, crank-pins and piston-rods, and he mentioned some curious cases of breakage; but he was willing to admit that possible bad forms were responsible for the failures he had experienced, a liberal admission that showed great liberality of mind. The trend of the discussion was decidedly in favor of steel for crank-pins and driving-axles.

In a brief discussion on Inside Check Valves, Mr. Forney made strong arguments in favor safe methods. He dwelt earnestly on the horrible sufferings that had been inflicted upon people by check valves getting knocked off in accidents, and urged master mechanics to do all in their power to prevent suffering from such a source. In both associations and in his public writings, Mr. Forney has always been an earnest advocate of using every possible means to save human life and prevent suffering.

The report on wheel centers and a Standard form of Tire Section, led to a lively discussion, but there was less objection to the wheel center sizes proposed than might have been anticipated, considering the diversity of sizes in use. The meeting readily agreed to postpone coming to a decision about the best form of tire section until another year. As the master car-builders are likely to adopt a standard tread of wheel before next convention, there is a probability that a similar form will be adopted by the master mechanics for driving wheels.

When the time for the election of officers came round, an attempt was made to depart from the usual practice of promoting the first vice-president to the dignity of president. Mr Meehan considered that it would only be fair to make Mr. Setchel president after the long years he had served as secretary, and made a speech favoring that action, mentioning Mr. Forney for secretary. When the balloting came round, however, the members elected Mr. Wm Woodcock as president and Mr. Setchel as secretary, many of them thinking it proper to re-elect Mr. Setchel to his old position as a vindication from the reflections cast upon his work at the opening of the Convention. Mr. R. H. Briggs, of Paducah, Ky., was the only new officer elected, and his selection as second vice president was represented as an act of cordial harmony between North and South.

The comfort of members and their friends attending the convention was greatly enhanced by the cordial care and attention of the proprietor and employés of the Quincy House, where the headquarters of the association were held. The comfort of that house was in striking contrast with the apathy and carelessness displayed towards their guests by the proprietor and employés of the International Hotel at Niagara Falls, where the Master Car-Builders' convention found headquarters.

We will publish the papers read and the discussions thereon at the Master Mechanics' convention in our August issue.

ELEVATED RAILROAD SCHEMES.

The elevated railroads of New York have proved such a good paying investment for stockholders, that there is hungering and thirsting among capitalists to find another field where similar returns might be obtained on a similar outlay. Many eyes have been turned to Chicago as a possible land of promise, and every few days companies are incorporated to build elevated railroads in that city. If all the companies chartered get half their structures built, elevated railroads will rival the thoroughfares in number. If the surface railroads that traverse Chicago would do a little more to encourage and develop suburban and city travel, there would be no place for many years for elevated railroads; but most of these companies pay so small regard for what might really be made a valuable business, that their lack of enterprise is likely to raise a demand for better means of rapid transit that will in the near future eventuate in the building of elevated roads.

In all cities where the residence quarters extend two miles or more away from the business center, a demand is growing for rapid transit. In more than one case this demand has led to the building of cable roads for the propulsion of street cars. The cable system can be worked more cheaply, is more cleanly and quieter than operating by horses, but as a means of rapid transit it is a delusion. In Chicago, where the grip cars have been run more successfully than in any other city, the cable speed is six miles an hour in the portions nearest the city center, and eight miles an hour toward the city limits. The grip starts the cars quicker than horses, but horses run faster than six miles an hour when the car is got well under way, so that a passenger gets along just about as fast in a horse car as he does in a cable car. The projectors of cable car lines are given to calling theirs a system of rapid transit, and the public that have not been accustomed to cable propulsion regard a contemplated change to that system as offering the means of getting over the ground quickly. It is only when they pass through the stern reality of shivering for half an hour while a grip car is making a journey of two and a half miles, that men come to realize that the cable system is not what the fancy of the projectors painted it as a means of rapid transit. Chicago has gone through this ordeal, and the sophistry of parties interested who wish to obtain franchises for extension of the grip system excites ridicule and derision among ordinary citizens. The people there want steam cars of some kind to carry them to and from business, and they mean to have them, too.

The latest elevated railroad scheme for Chicago is the Union Elevated Railway Company, lately chartered to build a road on a suspension plan, the structure to be carried on suspended cables. All that is objectionable about the ordinary elevated structure is supposed to be eliminated from this system, but to a man looking on, the suspended cable advocates appear to be rushing into many evils that they know not of, but which they will learn very graphically if ever their enterprise goes beyond the paper period. Experience with all the elevated railroad structures yet built has demonstrated the fact that they were designed too weak. Speculators and patentees may wish to erect slim and cheap elevated structures for railroads to run upon, but engineers and other practical men who know what is required to hold up a fast moving train safely, advocate stronger roads than any that have yet been built, and their views are likely to prevail.

ANOTHER NARROW-GAUGE ROAD GOING.

The announcement is made that Eastern capitalists have purchased the Toledo, Cincinnati & St. Louis Railroad, with the view of changing the property to standard gauge and consolidating it with the Toledo, Kansas City & St. Louis Railroad. This road has 798 miles of track, and with the exception of the Denver & Rio Grande is the longest narrow gauge railroad in America. The contemplated change of gauge will greatly reduce the narrow gauge mileage in the United States. A portion of the Toledo, Cincinnati & St. Louis road was chartered as early as 1872, and part of it was built a year later.

The low cost of building this road, and the reduced expense of operating compared to standard gauge roads, did much towards influencing public opinion in the direction that caused the agitation in favor of narrow gauge railroads a few years later. The arguments used by the advocates of narrow gauge were based on fallacies that deceived few experienced railroad men, but they deceived many capitalists, and money was freely advanced to construct

cheap lines through districts that did not supply business enough to defray operating expenses. The claims were made that a narrow-gauge road could be built at one-third the cost and operated at one-third less expense than a standard-gauge road, and that it could do nearly an equal amount of business and accommodate the public just as well. When these claims were properly examined, it was found that the cheapness in first cost generally resulted from inferior work and material, and that a substantially built narrow-gauge road cost nearly as much as a good one of standard gauge, and was decidedly inferior as a means of handling traffic. The reduction in operating expenses was obtained by reducing the proportion of dead weight to load in cars. Before the agitation in favor of narrow-gauge roads, it was customary to carry in freight cars a load about equal to the weight of the car. The narrow gauge advocates inaugurated the practice of carrying from one-third to one-half more than the equivalent of dead weight, but when they supposed the standard-gauge roads were not in a position to do likewise they were mistaken, for their example was promptly followed.

The excitement in favor of a narrower gauge than the standard was to many individuals an expensive mistake; but its lessons have not been without influence. The discussions, experiments and investigations that resulted, demonstrated clearly that widening the prevailing gauge was more necessary than narrowing. The emulation that resulted in favor of cheap building and cheap operating was the means of greatly reducing the original cost of standard-gauge roads, and stirred up master car-builders to move in the direction of designing cars that would carry two pounds of freight to one pound of structure. The large proportion of paying load to dead weight, now so common, would not yet be reached but for the stimulation to improvement supplied by the narrow-gauge fallacy.

PASSENGER CAR ORNAMENTATION.

The rage for standards in car construction has led some one to suggest that there should be a standard for the ornamental finish of passenger cars. However desirable such a standard may be on some accounts, the suggestion is not likely to be received with much favor, for the reason that interchangeability in the style and finish of such cars is not very essential. Utility has practically nothing to do with what is purely decorative, and there can be no standards in the matter of decoration, except what may be prescribed for the time being by the prevailing taste or fashion. The progress, nevertheless, which has been made during the last twenty years in what may be called the esthetics of passenger car construction has been steady and continuous and in the right direction. There is much less incongruity, cheap imitation and toy work than formerly. The freaks and vagaries which characterized the earlier styles of embellishment, originating as they did in a desire for mere display, have given place to styles that are less glaring, showy and obtrusive, and at the same time richer and more costly. The progress in this respect has fairly kept pace with the improvements in mechanical appliances for rendering cars safer and more comfortable for their occupants.

In respect to interior decoration, as exemplified in passenger cars of recent construction, there would seem to be but a narrow margin for further progress in the way of making such cars more attractive, luxurious and beautiful. Yet a writer in a technical journal suggested, not a great while ago, that the time had come for a new departure in the interior finish of passenger cars, and that it should be made to conform to some recognized standard of taste that will be less liable to periodic changes. What the distinctive features of such a standard should be is not indicated, except that greater simplicity is needed, less violent contrasts, a more subdued tone in color and a more perfect harmonizing of details in order to enhance the general effect. These requisites are already very generally recognized, and it is also conceded, or at least ought to be, that rare cabinet woods as a material for inside finish are not likely to give place to anything else so long as the supply is as abundant as it is now. No artificial devices can rival these woods in their varieties of grain and color, their durability, intrinsic beauty and adaptation to the special purpose of car work. The freaks of fashion may give a transient popularity to other and even more costly styles of embellishment that will have their day and then be looked upon with indifference and aversion because they are destitute of any true life or decorative power. There has been a veneering craze and a black walnut craze, both of which have died out with no prospect of a revival; and although walnut is a cabinet wood, it was sent to Coventry because it fell short of mahogany and rosewood; and veneering went the same way because it was a make-believe that deceived nobody.

An experienced car painter has said that the prevailing styles of decoration for the best class of dwelling houses should be the criterion for cars. To a certain extent this may be so, but it is evident that a great many kinds of decoration that are well adapted to a stationary structure would be out of place in a car, not only on account of its rapid movement, but because the available space for inside decoration is limited mainly to panels and ceiling, which do not admit of the same kinds or breadth of treatment as the larger surfaces of the walls of a house. We do not think there is any need for starting a new boom in this matter. The tendency, as exemplified in the best specimens of recent construction, is clearly in the right direction. What is tawdry, fantastic and cheap is steadily making way for what is simple, unobtrusive and genuine. The principle of ornamenting construction instead of constructing ornament is becoming more widely recognized: and as for standards, there are not likely to be any except local ones.

The ordinary coaches, or day cars, of the Pennsylvania road are an example of a local standard which fairly illustrates the principle above referred to. The wood for the inside finish is chiefly ash, with a few subordinate strips or moldings of cedar or cherry. This gives to the car a light and cheerful as well as strong and substantial appearance. The window panels have channeled grooves in the form of a rectangle running along their outer margin and crossing at the corners, while in the middle and at the top and bottom, well executed sunken rosette carvings are sparingly but effectively introduced, leaving a good quantity of plain surface ornamented with the natural grain of the ash. The head linings harmonize with the prevailing style of the woodwork, the ground colors being light and subdued, and the borders and center-pieces unique and simple, without being over prominent. The basket racks are also of a style that seems to be suggested by the panels and ceiling, each matching the other in a general unity of form, lines and angles. In this kind of ornamentation, the pleasing and satisfying result is not due to any one feature of the work, but rather to a happy combination or blending of all the parts so as to avoid incongruity. The test of true art is to conceal art. Ordinary observers do not probably think of ornament at all when riding in these cars, because there is little in the startling, vulgar way to suggest it. It is, in fact, so thoroughly subordinated to the material, and so simple, direct and honest in its every detail, that it can not well be contemplated apart from the base upon which it rests, and with which it is identified.

We do not speak of these cars as exceptional by any means. Similar indications of progress are observable every year in cars of new construction, and it is a great advance upon the old imitation devices of veneering, marbling, graining and gilding, painted Cupids and floral wreaths, fictitious architectural panels, medallions, etc. Ornament of any kind is not an essential thing, and if it is fallacious it is hardly worth the having. It requires but a moderate degree of discernment to see the difference between unostentatious elegance and flash vulgarity. We do not need mere splendor for the sake of splendor, but only so far as it harmonizes with the natural instincts of true refinement.

CATTLE CARS.

A writer in the June number of the *Railway Equipment and Mileage Guide*, in calling attention to the urgent need for improved stock cars, says:

> "The age has arrived when a class of cars better adapted for the transportation of live stock than those now in general use, must and will be provided. The initial movement having been made, and repeated and careful tests of the improved cars having fully demonstrated, beyond question, that such cars are thoroughly practicable, we shall certainly see their number greatly augmented at no distant day."

We do not know the precise nature of the initial movement to which the writer refers, but whatever it may be, it is to be hoped that the "thoroughly practical" cars alluded to will receive the early attention of shippers and railroad men. The abuses practiced in live stock transportation have been dwelt upon until the subject has become wearisome, but apparently without any very great relief, in a humanitarian way, to the cattle. Five or six years ago, as every body will remember, the American Humanitarian Association, of Boston, offered a prize of $5,000 to be paid to the inventor of a car, or of any arrangement that could be applied to stock cars then in use, by which cattle could lie down and rest in the cars and be fed and watered while in transit. Experienced and capable railroad men were appointed as judges to decide upon the merits of the designs presented, and some 700 models and plans were sent in by inventors and others who were eager for the prize. A whole year elapsed between the opening of the tournament and the rendering of judgment, the judges deciding that none of the competitors had sufficiently complied with the specified requirements to be entitled to the prize, nor was any part of it paid to the inventors of the more meritorious of the designs. The truth was, that the requirements were so exacting as to baffle inventive ingenuity. The target was placed so far off that it was a waste of ammunition to try to hit it.

It is obvious that no attempt to mitigate the sufferings of live stock during transit will be successful without an increase of the cost of transportation by carrying a less number of cattle to a given area of floor space. The rapacity of shippers and transporters, stimulated by competition in freights, can not be checked by any sentimental solicitude for the physical comfort of the cattle. The maximum of load to minimum of space must be maintained. To change it so as to favor the cattle without cost to the shipper is out of the question, or it would have been done before this. The constant tendency in freight transportation is to increase the proportion of paying weight, and it is not an easy thing to make live stock an exception. The trouble is not that suitable cars can not be built. They have been built time and again. No extra mechanical skill is needed to design them, and this is the reason why there were so many competitors for the $5,000 prize five years ago, the designs being so good and so numerous that the judges were unable to decide which was the best, and so escaped from the dilemma by deciding that none of them was best.

"ENGINEER" TO WHOM "ENGINEER" IS DUE

At the recent meeting of the American Society of Mechanical Engineers at Chicago, a proposal was made to introduce the term "dynamical engineer" as a substitute for "mechanical engineer," and it was contended that the change would be a decided improvement. The members, however, opposed the change with cordial unanimity.

The technical school members of the society are greatly distressed at what they regard as an objectionable corruption of language which the American people have fallen into, of calling the men who run engines, engineers. They are struggling to institute a reformation in language that shall compel all and sundry to confine the term engineer to the fine-clothed gentlemen who have received permission from some school or college to write M. E., C. E., or some other sort of E., behind their names. The movement in this direction is at present laboring in the travail of bringing forth new names by which locomotive engineers and stationary engineers shall be known. When this momentous work is finished, railroad companies and others concerned, will be called upon to adopt the new nomenclature without delay, to the end that the college graduates who may or may not know anything practical about engineering, may enter upon the undivided possession of the title. The movement is said to be exciting almost as much enthusiasm as the crusade in favor of making the metric system compulsory.

THE FREIGHT BRAKE TESTS.

On another page we publish the greater part of a pamphlet issued by the Committee of the Master Car-Builders' Association appointed to investigate the subject of Freight Car Brakes. The purpose of the pamphlet is to inform all concerned respecting the way the brake tests arranged by the committee will be conducted at Burlington, Iowa, next month. Any one interested in the subject of train brakes can not fail, on reading the portions we have published, to be struck with the vast amount of thoughtful labor that has been devoted to perfecting the arrangements for these brake trials. The first essential toward finding out the teachings of any experiment is the providing of proper means for recording exactly what has been done. There have been very many experiments made with American railroad machinery for one purpose and another, but there is very little data of any value to show for the expense incurred. It has often happened that engineers investigating the same phenomena have come to conclusions diametrically opposite. In most cases the deductions made from experimonts have been exceedingly conflicting. The cause of this doubtless has been that proper means of recording experiments correctly were not provided, and because the men conducting the experiments were not familiar with the operations they were called upon to perform. An engineer has to learn the art of conducting tests as well as he has to acquire any other work requiring skill.

The brake trials at Burlington will be made under more auspicious conditions than anything of the kind ever undertaken in America. The Chicago, Burlington & Quincy Railroad Company have provided the most perfect apparatus ever designed for making tests of this kind, and many special apoliances have been devised and constructed to facilitate the work and insure accuracy. In addition to all this, the work will be done under the direction of a thoroughly competent superintendent of tests, aided by a corps of assistants who have been thoroughly drilled to the operations required of them in a series of preliminary tests. All railroad companies interested in knowing exactly what can be done with freight car continuous brakes, and what the various brakes offered for their patronage are capable of doing have every reason to be grateful to the officers of the C., B. & Q. for the labor and expense they have incurred in a public cause. Accurate information obtained on a subject of this kind is not merely gratifying as an increase of scientific knowledge. It produces material saving to railroad companies by preventing accidents and reducing destructive wear of machinery.

A series of brake tests conducted in England some years ago by Mr. George Westinghouse and Captain Galton, Government Inspector of Railways, revealed a great many new facts about brakes for passenger train service. The data collected at that time gave accurate formulas for the designing of brake apparatus that have saved railroad companies large sums of money by preventing the sliding of wheels. There is no reason to doubt that the tests to be made at Burlington, July 13, will prove equally valuable and provide much needed accurate information about freight car brakes.

THE report of the executive committee of the Car-Builders' Association on the coupler question confirms the correctness of the views that have from time to time been expressed in these columns as to the possibility of any early or practical solution of the problem. The twelve devices selected at Buffalo last September for service-tests to be made during the ensuing six months seemed to promise some definite action at this year's meeting of the association, not as a finality, but as a futher step in that direction that would not have to be retraced. But the committee in its report has opened the way for another year, and perhaps several years, of discussion, investigation and testing. The twelve Buffalo couplers have been reduced to seven, and these seven are to be reinforced by an indefinite number of such new couplers as may be recommended for trial by five members of the association under certain conditions and contingencies. The upshot of it is, that the committee has virtually abdicated its functions in respect to couplers, leaving the whole matter in the hands of the association, and the association is as much at sea about it as ever, if not a little more so. The committee, in fact, recommends that the wisest thing to be done now is for the association to give its attention to draw-heads and dead-woods, and let the coupler business drift towards the survival of the fittest. In the mean time, the 700,000 freight cars in the country must keep on running and interchanging, individual roads will select and use their favorite couplers, and legislators and railroad commissioners will regulate things in their respective jurisdictions as best they can.

WE print on another page the communication of a correspondent who attended the recent convention of the Master Car-Builders at Niagara Falls. His observations in regard to certain peculiarities which attracted his attention in the course of the proceedings are very frankly stated, and as we have reason to believe that others who were present imbibed similar impressions, it is right and proper that our correspondent should be heard. If he is wrong in what he says, time will show it. If he is right, the future well-being of the Association will be none the less by giving publicity to his views at this time instead of suppressing them.

There is no disguising the fact that there are two distinct elements in the Association, the old and the new, and that its efficiency and harmonicus working depend very much upon whether a broad line of distinction between these elements is to be kept up or practically obliterated. New blood is naturally sanguine, opinionated, overweening and confident, and when to this is added a rattling volubility, so effective in off-hand discussion, the taciturns are apt to become disheartened by the mere onset and noise of the verbal artillery. There is an eagerness to hold the reins, and a plentiful lack of that safe conservatism which comes from large experience. This was exhibited in a marked degree at the annual meeting last year, along with a pretty clearly revealed purpose to make the Association subservient to the interests of a great leading road and its affiliated lines. The new blood element engineered the movement, which fortunately miscarried by being too precipitate and by having its purpose too thinly disguised. No attempt of a similar kind was made this year. There is a greater willingness to proceed by more discreet and slower methods, but obviously with the same purpose of shaping the action of the Association upon controverted points so as to favor the ascendency of a particular interest. This is the gist of what our correspondent says, and we print his communication because it embodies what is said in plainer terms by others, who, for obvious reasons, do not give their views public expression.

Master Car-Builders' Association.

The following officers were chosen at the recent annual meeting of the Association at Niagara Falls: President, B. K. Verbryck, Chicago, Rock Island & Pacific; Vice-Presidents, Wm. McWood, Grand Trunk; John W. Cloud, Pennsylvania Railroad; E. W. Grieves, Baltimore & Ohio. Treasurer, John Kirby, Lake Shore & Michigan Southern. Executive members for two years, F. D. Adams, Boston & Albany; L. Packard, New York Central & Hudson River; E. B. Wall, Pittsburgh, Cincinnati & St. Louis.

After the adjournment, the Executive Committee met and re-elected Mr. M. N. Forney Secretary.

MISSOURI CAR & FOUNDRY CO.,
ST. LOUIS, June 23, 1886.

EDITORS CAR AND LOCOMOTIVE BUILDER:

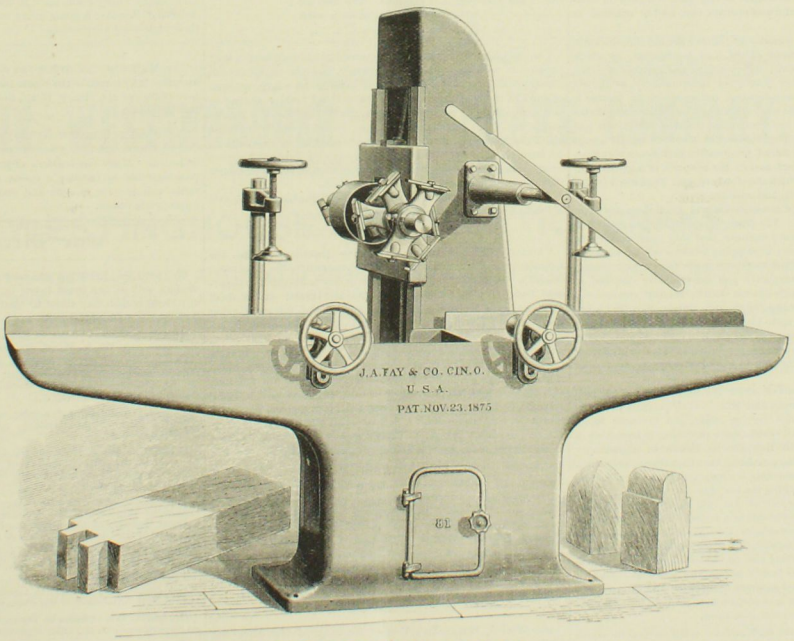
DEAR SIRS: As the newspaper reports regarding the fire which occurred in our works on the night of Friday, June 18, were very much exaggerated, we desire that you will correct this impression by stating that there was only a portion of our works destroyed, and we shall be prepared to resume business by the 1st of July, utilizing one of our erecting shops for a wood machine shop, which will be equipped with the latest and best machines, and the burnt property will all be restored and our condition will be as good if not better than ever by the 1st of August.

We write this to you in order that our friends throughout the country may know that we hope to be in position to receive orders that may be sent us, or make any contracts by the 1st of August next, and think that a notice to this effect through your widely circulated paper will be of benefit.

WM. H. GARDNER, Vice-President.

DURING a recent trip over the New York Central with a special train, the car in which President Depew was riding was hurled about in a collision. In the course of an interview respecting the accident, Mr. Depew treated the matter humorously and said: "Makes you think of your grandfather's ancestry. But my car behaved just as a railroad president's car ought to behave. I woke up by reason of a sudden elevation of my head above the ordinary level. The car had tipped up at the rear end. As I came down it rolled first to one side, then to the other, then reared up in front, and came down pat and firm on the track. It demonstrated the excellent discipline of the New York Central rolling stock beyond any question."

A RECENT issue of the Cedar Rapids *Gazette* contains engravings illustrating the new headquarter offices recently built by the Burlington, Cedar Rapids & Northern Railway. There are also portraits of several of the officers of the company, among them Mr. R. W. Bushnell, master mechanic. The latter, which possesses the unusual feature among newspaper portraits of being a good likeness, is accompanied by a biographical sketch, which tells that Mr. Bushnell served his apprenticeship to the machine trade in the Rogers Locomotive Works. After working in different parts of the East for a few years, he went west in 1853, and entered the service of the Chicago & Northwestern Railway. The sketch does not mention it, but we know that Mr. Bushnell rebuilt the old "Pioneer," the first locomotive owned by the Chicago & Northwestern railway, and changed the engine from the double-ended rocker reversing-gear to the V-hooks, which are now on the engine. After the engine came out of the shop, Mr. Bushnell went running it on the pay car and other light service. He has many stories to tell yet of the exceeding smartness of the little engine, which was about the eighth that Baldwin built. Mr. Bushnell was for several years a division master mechanic on the C. & N. Railway. He has held his present position since 1872.



VERTICAL CAR TENONING MACHINE.

In cutting the tenons on car sills, it is desirable to complete each timber without reversal. To accomplish this result this machine has been designed, and most successfully performs the operation of cutting single, double, or triple tenons on both ends of long timber from one face, without turning the stick end for end, by passing the stick by the machine, cutting the tenoning on one end as the head passes downward, on the other end as it is carried upward. It is self-contained, will stand on any floor, and requires no braces or support whatever.

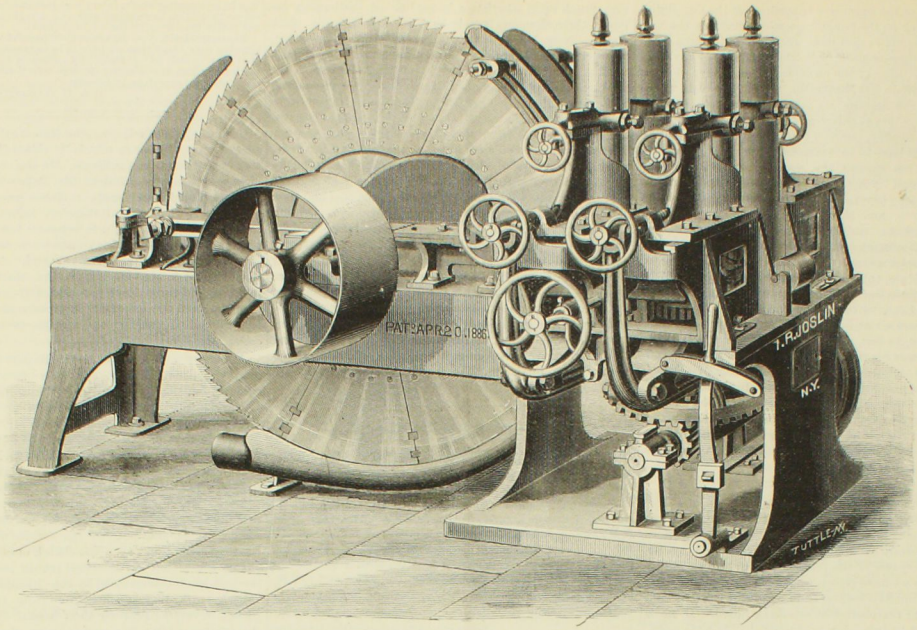
It is very heavy and substantial, built in the very best possible manner, and meets a want long felt in every establishment working timber for cars, bridge builders, etc. The amount of work that can be done with it can only be measured by the amount of material that can be presented to it.

It has two iron tables in fixed positions, having a gap between them, for the passage of the heads below the surface, arranged at a convenient height for handling the timbers, with adjustable fence for the thickness of the shoulder on face side of timber, screws for holding down, and gauges to determine the length of tenons.

The heads are made of steel and traversed vertically, on a column, by means of a hand lever, the frame carrying the head being so counter-balanced as to take from the operator all the weight, either in ascending or descending. The countershaft placed vertically over the machine, leaving the floor clear of all obstructions, the belt remaining at the same tension in whatever position the head is working.

The machine may be used for cornering, beveling, smoothing, rabbeting or cutting down on the sides of timber, by fixing the head and passing the timber as in a planing machine, and the ends can be rounded or molded as well as cutting all styles of tenons upon them.

The T and pulleys are 12" × 8", and should make 700 revolutions. Manufactured by J. A. Fay & Co., Cincinnati, O.



JOSLIN'S CIRCULAR RE-SAWING MACHINE.

The engraving represents a circular resawing machine, designed and patented by Mr. I. R. Joslin, of the S. A. Woods Machine Co., New York, and made by that company, which, while retaining the general features common to this class of woodworking machines, embodies a number of original features designed to render it notable, simple, strong and compact in construction, convenient to run and operate, and highly efficient in performance.

The special features of superiority claimed are the simplification and substantial improvement of the feed mechanism, by which the rolls are made accurately self-centering and capable of every form of adjustment, either jointly or independently, as the requirements of the work may demand, and by which the lumber is presented to the saw in the most advantageous manner and under better control, throwing less strain upon the sides of the saw and permitting, as a consequence, the use of a saw of lighter gauge than has hitherto been found practicable, and hence making a decided saving in saw-kerf, and in the adoption of a greatly improved mechanism by which the forward and backward feed is operated with a single belt, and with one lever.

The principal features of construction will be understood from the following description: The frame is cast in two pieces, which are bolted together in such a manner that they may readily be taken apart for convenience in shipping where a saving of space may be desirable. The feed-works are made heavy and strong, and the working parts compactly and conveniently disposed, so that all movements and adjustments shall be readily commanded by the operator. The guides for the roll stands, it will be observed, are brought well up to the central point of the board to be sawed, giving a free action of the slides in opening and closing the rolls, and insuring an equable pressure on the whole width of the board, and allowing the rolls to work perfectly on lumber of unequal thickness.

The mechanism by means of which the movements of the feed rolls are controlled is simple and effective. The rolls are connected together with arms having what the inventor terms "equalizing bars" and bell cranks, each pairbeing independent in action and provided with independent means of adjustment. When connected up with the equalizing bars the rolls are accurately self-centering. By disconnecting the long arm from the roll stand and equalizing bar and bolting the bar fast to the sliding plate, the operator may hold the rolls on one side rigid in any desired position for slabbing from the side of a board. For this work the hand-wheels shown on both sides of the machine are called into play to adjust the rolls independently of each other in the desired position, the large hand-wheel seen on the left enabling the operator to move the feed works bodily across the machine. Thus, it will be seen, these joint and separate movements and adjustments of the rolls are so complete and perfect as to provide for every requirement that may be thrown upon them.

A feature of special merit, furthermore, is the method by which the forward and backward feed is obtained by the use of a single belt and the lever seen on the left of the machine. The mechanism by which this is effected is in the form of a clutch engaging or disengaging appropriately disposed gearing. It is simple, strong and durable, and not liable to become disarranged.

It will be observed, likewise, that the frame of the machine is so designed that the operator may approach close to the saw blade to file and set the saw when needful, without requiring him to climb on the top of the frame to reach it.

The machine is built in the best manner, all shafts are of steel, and the saw flange is of hammered steel, to insure proper stiffness, and at the same time allow of a thin flange. The machine is furnished with either a segment blade, as shown in the accompanying engraving, or with a solid saw, and with either solid or inserted teeth, as the users may prefer. The inserted teeth are made as light as 17 gauge, and the solid teeth as light as 21 gauge, though the makers recommend for rough hard work a saw of 18 gauge.

Four sizes of this machine are built, which differ only in the size of saw and weight of machine. The sizes are:

60 in.	diameter, cutting	26 in.	wide.
56 "	"	24 "	"
50 "	"	21 "	"
46 "	"	19 "	"

The machine, in its present form, embodies the results of a long experience with this class of machinery, and the makers confidently claim for it that it is capable of turning out a large amount of work of the best character; that it makes a notable saving in saw-kerf, since its construction permits of the use of a lighter gauge saw than has heretofore been found possible on other machines of its class using circular saws, and that it is capable of performing satisfactorily the work of re-sawing lumber of almost every description, from picture-backing to the heaviest lumber that can be handled on a machine of its class.

Any further particulars may be obtained from the S. A. Woods Machine Co., 91 Liberty street, New York.

"ONDOYANT" is the name of a wavy, translucent glass, the manufacture of which has just been commenced by the Mississippi Glass Co., of St. Louis, Mo. The new article is designed to supersede Venetian glass. It is a rolled product turned out in sheet form, and is of all cathedral colors, one side of the sheet being wavy and undulating to the touch, and the reverse side approximately smooth. The sheet is about one-eighth of an inch thick, and can be cut with diamond or wheel. When held in the light the beauty of the glass is brought out in its fullness. The diffusion of the rays is admirable. It reflects and transmits the rays equally well, and can be made of almost any shade. The Pennsylvania R. R. is using the "cathedral" glass, and the Barney & Smith Co. the "ondoyant," which excels all other glass for decorative purposes. Mr. A. L. Rowe, who is well known among railroad men, is the general manager of the company.

THE AJAX METAL CO., of Philadelphia, manufacture a sheathing metal which is a chemical alloy of lead and copper. It is very pliable, and at the same time tough and hard enough to resist the friction of water to which it is exposed on the keel of a vessel, without material wear or adherence of barnacles. It is also equally well adapted for car roofs, and does not crack or break by expansion or contraction, nor does it need to be painted. It is said to be superior to all other ship sheathing, and can be furnished at a much lower cost.

MR. WM. A. WOOD, JR., Master Mechanic of the Allegheny Valley Railroad, died at his residence at Verona, Pa., May 29, aged 34 years. He entered the service of the road in 1868 as an apprentice, and was appointed master mechanic in 1884, succeeding the late George W. Glass. Few men so young had so thoroughly mastered the science of railroad machinery. Excellent in character, capable in management and clear in judgment, he represented the highest type of an American mechanic.

MR. GEORGE ROYAL, representative of the Nathan Manufacturing Co., of New York, has moved to Chicago, where he will look after the business of the company. Mr. Royal is an old railroad master mechanic and superintendent, and his practical knowledge of railroad machinery contributes greatly to his success as a commercial traveler.

THE PENFIELD BLOCK CO., Lockport, N. Y., is filling an order from the Erie Express for express platforms, wagons and barrows.

W. R. ELLIS & CO. have received orders from the Union Pacific and Lehigh Valley roads for "Brunswick" wheels, and the Philadelphia & Reading is going to try some of them under tenders of their high-speed locomotives.

THE MISSOURI CAR & FOUNDRY CO., of St. Louis, has opened an office in Chicago, in the Home Insurance Building. The office is in charge of Mr. Henry Wells, the Chicago representative of the company.

THE SAMSON CORDAGE WORKS, operated by J. P. Tolman & Co., of Boston, are filling several orders for special patterns of bell-cords. Many car-builders object to defacing a handsome passenger car by running a coarse rope through it, when a few cents will pay for a neat and ornamental bell-cord, made in appropriate colors.

Our Directory.

We note the following changes since our last issue. Our readers will do us a great favor by giving us prompt notice of any changes that may come to their knowledge or of any errors that may be noticed in our list:

Allegheny Valley.—John C. Glass has been appointed Master Mechanic, vice W. A. Wood, Jr., deceased.

Chicago, Milwaukee & St. Paul.—J. N. Barr has been appointed Superintendent of Car Department, vice John Bailie, resigned. W. E. Kittridge, heretofore Master Car Builder, is appointed Assistant Supt. of Car Dept.

Chicago, Rock Island & Pacific.—H. F. Royce, heretofore Assistant General Superintendent, has been appointed General Superintendent.

Chicago, St. Paul, Minneapolis & Omaha.—Jas. McCabe has been appointed Superintendent of Eastern Division, vice A. A. Hobart, and H. S. Jaynes succeeds McCabe as Superintendent of Nebraska Division.

Chicago, St. Paul & Kansas City.—This company having purchased the Wisconsin, Iowa & Nebraska road, G. C. McMichael, General Manager of the latter road, has been appointed General Manager of the Chicago, St. Paul & Kansas City.

Chicago & Indiana Coal.—A. A. Hobart, late of the Chicago, St. Paul, Minneapolis & Omaha, has been appointed General Superintendent.

Fall Brook Coal Co.—R. H. Canfield has been appointed Assistant Superintendent of the roads operated by this company.

Louisville, New Orleans & Texas.—M. Burke having resigned as Superintendent, the office is abolished.

Mississippi & Tennessee.—M. Burke, heretofore of Louisville, New Orleans & Texas, has been appointed Superintendent.

St. Louis & San Francisco.—Henry L. Morrill, late of Boston, Hoosac Tunnel & Western, has been appointed General Manager.

Syracuse, Binghamton & New York.—W. K. Niver having resigned as Superintendent, A. H. Schwartz has been appointed Assistant Superintendent.

Union Pacific.—T. A. Davies has been appointed Master Mechanic of the Nebraska Division, vice J. H. McConnell; and J. F. Hovey, Master Mechanic of the Wyoming Division, in place of T. A. Davies, transferred.

Wabash, St. Louis & Pacific.—K. H. Wade has been appointed General Superintendent. G. W. Stevens is Superintendent of Eastern and Middle Division, and M. H. L. Magee, Superintendent of Western Division.